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SUBURBAN AND FARM VEGETABLE GARDENS



HOME AND GARDEN SERIES No. 9

U. S. DEPARTMENT OF AGRICULTURE

A GOOD GARDEN adds materially to the well-being of the family by supplying foods that might not otherwise be provided. Fresh vegetables direct from the garden are superior in quality to those generally sold on the market, and in addition are readily available when wanted. As a large number of farmers now use lockers and home freezers, even more of the vegetables from the garden can be utilized than when canning and fall storage were the only means of preservation.

This publication, intended for country-wide distribution, gives only general information. Any gardener using it needs also local information, especially on the earliest and latest safe planting dates for vegetables and any special garden practices and varieties that are best for his location. Gardeners may get local information and advice from their State agricultural experiment stations (locations below), agricultural extension services, agricultural colleges, and county agents. Farmers' Bulletin 2000, Home Vegetable Gardening in the Central and High Plains and Mountain Valleys, will be especially useful to gardeners in that part of the United States. More detailed information on most of the crops discussed in this bulletin can be obtained from the United States Department of Agriculture, Washington 25, D. C. It is not the purpose of this publication to go into details of the preservation, use, and storage of vegetables. Publications of the Department cover those subjects.

This publication supersedes Farmers' Bulletin 1673, The Farm Garden.

State Agricultural Experiment Stations

| | | | | |
|---|--------------------------|------------------------------|-------------------------------|-----------------------------------|
| ALABAMA Auburn | IDAHO Moscow | MICHIGAN East Lansing | NEW YORK Geneva Ithaca | SOUTH DAKOTA Brookings |
| ARIZONA Tucson | ILLINOIS Urbana | MINNESOTA St. Paul | NORTH CAROLINA Raleigh | TENNESSEE Knoxville |
| ARKANSAS Fayetteville | INDIANA LaFayette | MISSISSIPPI State College | NORTH DAKOTA Fargo | TEXAS College Station |
| CALIFORNIA Berkeley Davis | IOWA Ames | MISSOURI Columbia | OHIO Columbus Wooster | UTAH Logan |
| COLORADO Fort Collins | KANSAS Manhattan | MONTANA Bozeman | OKLAHOMA Stillwater | VERMONT Burlington |
| CONNECTICUT Storrs | KENTUCKY Lexington | NEBRASKA Lincoln | OREGON Corvallis | VIRGINIA Blacksburg |
| DELAWARE New Haven | LOUISIANA Baton Rouge | NEVADA Reno | PENNSYLVANIA State College | WASHINGTON Pullman Puyallup |
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| GEORGIA Athens Experiment Tifton | MARYLAND College Park | NEW JERSEY New Brunswick | SOUTH CAROLINA Clemson | WISCONSIN Madison |
| | MASSACHUSETTS Amherst | NEW MEXICO State College | | WYOMING Laramie |

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Suburban and Farm Vegetable Gardens

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Garden Sites

A back yard or a plot near the house is the most convenient spot for a home vegetable garden. Poor drainage, shallow soil, shade from buildings and trees, and other serious draw-backs, however, may make a piece of land farther away better for the purpose, even though it is not close to the kitchen.

Many farm and country gardens are in one unit, in easy reach from the house. Practically all vegetables, including potatoes, sweet corn, and vine crops, may be grown in this one area, often a half acre or more in size, and planned so that most of the work on it can be done with horse-drawn or power tools.

Other gardens, however, may be in two or more places. A fairly small kitchen garden close to

the house is planted to beets, beans, carrots, onions, and other vegetables that can be grown intensively, usually with hand tools. Another plot—often between rows of young fruit trees or in an easily accessible part of a field where soil and other conditions are favorable—is planted to potatoes, sweetpotatoes, sweet corn, vine crops, tomatoes for canning, and other crops that require more space. This plan has many advantages. The greatest is that labor can be reduced by using standard farm tools. It also permits planting individual crops in new places each season. It is particularly attractive to large growers of sweet corn, beans, peas, tomatoes, and other vegetables for marketing or for preservation by canning or freezing.

Protecting the Garden

Under most conditions in the country, the garden should be surrounded by a fence sufficiently high and close-woven to keep out poultry, dogs, rabbits, and other animals. The damage done by stray animals during a season or two may equal the cost of a fence. Such a fence not only protects the garden, it also serves as a trellis for beans, peas, tomatoes, and other crops needing support.

Rodents of various kinds damage garden crops in most sections of the country. In the East, moles and two or three species of mice cause much injury. Moles burrow under the plants, causing the soil to dry out around the roots. Mice either work independently or follow the burrows made by the moles, destroying newly planted seeds and young plants. Both pests may be partly controlled by trapping, using poison baits or gases, or placing repellents in their runs. In the West, where ground squirrels and prairie dogs are prevalent, poisoning is the usual and most effective remedy.¹

Soil, Drainage, Sunshine

Fertile, deep, friable, well-drained soil is one of the first essentials for a successful garden. The exact type of soil is not so important as that it be well drained, adequately supplied with organic matter, retentive of moisture, and reasonably free from troublesome stones. The character of the subsoil is of vital importance. The presence of hardpan, hard shale, rock ledges, gravel beds, or very deep sand is likely to make the development of a high-grade garden soil extremely difficult if not impossible. On the other hand, an infertile soil that has favorable physical properties may be brought into high productivity by incorporating organic matter, accompanied by the lib-

eral use of soil amendments and commercial fertilizers.

A gentle slope—not more than 1½ percent—facing in a southerly direction, is favorable for early crops. In sections subject to strong winds, a board fence, hedge, or other form of windbreak on the windward side of the garden is recommended. Hedges and other living windbreaks should be far enough away to prevent shading or root interference with the garden crops.

Good drainage of the soil is essential. Soil drainage may often be improved by properly installed agricultural tile, by open ditches, and, in some situations, by subsoiling to loosen the soil. The garden should be free from low places where water might stand after a heavy rain. Water from surrounding land should not drain upon the garden, and there should be no danger of flooding by overflow from nearby streams.

Air drainage is important in lessening the danger of damage by frost. A garden on a slope with free movement of the air to lower levels is most likely to escape late-spring and early-autumn frost damage.

The garden should receive the direct rays of the sun all day long. Certain crops can stand some shade, but no amount of fertilizer, water, or care will replace the sunshine that is needed. Even where trees do not shade the garden, their roots may penetrate far into it and rob crops of moisture and plant food (fig. 1). Damage to garden crops by the roots of nearby trees may be largely prevented by digging a trench 1½ to 2 feet deep between the trees and the garden, cutting all the tree roots crossing the trench, and placing a tight barrier of waste sheet metal or of heavy roofing paper along one wall of the trench, then refilling. This treatment is usually effective for several years.

Garden Preparation and Soil Improvement

Manure and Compost

Fortunately, animal manure is still available for most farm and country gardens. For a new plot, an application of 15 to 20 tons of decomposed cattle or horse manure to a half-acre garden is none too much if plowed under a few weeks before planting. Poultry litter is usually much higher in nutrient constituents, and the rate of application should be from one-fourth to one-third that of cattle or horse manure. In the succeeding years, 8 to 10 tons an acre of cattle or horse manure, or

one-fourth to one-third that quantity of poultry litter, should be applied each year unless there is evidence that the soil is becoming too high in nitrogen for certain crops like tomatoes and beans. If that stage is reached, the manure should be applied only to the part of the garden where crops that require heavy feeding of nitrogen are to be planted—for example, the greens, the salad crops, and the cabbage group.

It is usually best to spread the manure just before plowing. As the garden is commonly planted soon after plowing, it is desirable that the manure be well-rotted and rather fine. During the first season or two, an additional application of thoroughly composted manure should be spread on the surface after plowing and worked into the topsoil. Within a season or two, material turned

¹ For additional information on rodent control, the following Fish and Wildlife Service publications may be obtained from the U. S. Department of the Interior: Conserv. Bul. 11, Rabbits in Relation to Crops; Conserv. Bul. 16, Mole Control; Conserv. Bul. 36, Control of Destructive Mice; and Wildlife Leaflet 237, Control of Woodchucks.

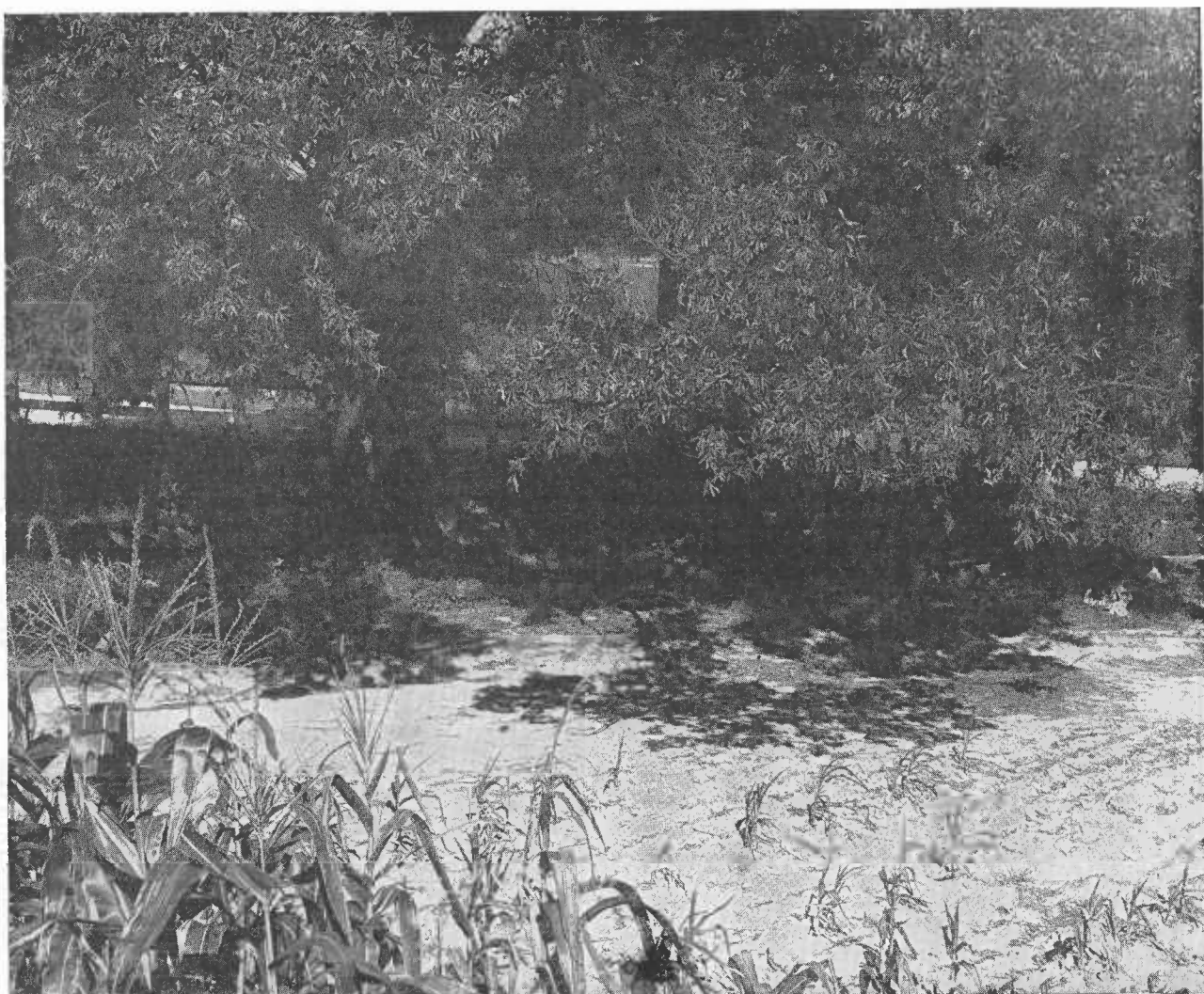


Figure 1.—Effect of tree roots on a nearby garden.

up from preceding seasons' applications will make this surface dressing unnecessary.

Many farm and country gardens on properties where no livestock is kept must depend on other sources of organic matter. Generally, manure can be bought from neighboring stock farms. Otherwise, artificial manure, prepared by decomposing vegetable matter in compost piles with the aid of chemical fertilizers, may be used. Materials suitable for the preparation of synthetic or artificial manure include straw, spoiled hay, grass or weeds, either green or dry, and chemicals to aid in the decomposition and to add fertility to the product. A common chemical mixture for this purpose consists of:

| | <i>Parts, by weight</i> |
|---|-----------------------------|
| Ammonium sulfate (20 percent nitrogen) ---- | 45 |
| Superphosphate (20 percent) ----- | 15 |
| Ground dolomitic limestone ----- | 40 |

This mixture is used at the rate of about 150 pounds to each ton of dry vegetable matter, or about 50 pounds to each ton of fresh green material. The proportions of vegetable matter and chemicals need not be exact. If less of the chemicals is used, the decomposition rate tends to be slower. However, by keeping the pile moist and mixing it two or three times at intervals of about 2 weeks the rate of decay can be hastened. On the other hand, there is no advantage in using more of the chemical mixture than indicated. An excess of chemicals does not hasten decomposition and may cause loss of nitrogen. The ground limestone is very important; it counteracts excessive acidity, thereby establishing conditions favorable for decomposition.

Synthetic manure may be prepared in any quantity. The method is simple: Spread a layer of the plant material 6 to 8 inches thick, using about a fourth of the amount to be prepared. Sprinkle



Figure 2.—*Making compost: New material (left) and old (right).*

over this a fourth of the quantity of chemical mixture required and wet down, but not enough to wash the chemicals away. Dry vegetable matter needs more wetting than green material. Add another layer of vegetable matter and its share of the chemicals, wet down, and continue the operation until all the material has been used and a flat-topped pile has been formed. Adding a little fertile soil to each layer hastens bacterial action. If not enough material is available to build a large pile within a few days, complete smaller piles to the desired height, using the material available at one time for each. Artificial manure prepared in the autumn is usually ready for use in early spring.

It is not desirable to trample the pile or otherwise pack it tight. Some looseness allows oxygen to enter, which stimulates decomposition. In the absence of enough rain to keep the pile moist, moderate watering is desirable; but heavy watering may interfere with bacterial action and cause loss of nutrients. With easily decomposable matter, moderate moisture, and warmth, as short a time as 6 weeks is sufficient for the desired degree of decomposition; but much longer periods, up to 6 months or more, may be needed to obtain satisfactory results with coarse materials under unfavorable conditions. A ton of dry straw or its equivalent yields about $2\frac{1}{2}$ tons of moist artificial manure, not greatly different from average farm manure in chemical composition or in crop responses.

The synthetic manure may be used for the preparation of soil-compost mixtures and potting soil. (See p. 3.) Practically every farm and country

home has access to large quantities of straw, leaves, weeds, grass, and other vegetable matter that can be transformed into synthetic manure at very little expense except for labor. The method offers a practical means for obtaining a material that is sometimes otherwise unavailable at reasonable cost.²

Every suburban and farm garden needs a soil-compost pile from which a supply of rich material for growing plants is available at all times. One method of making such a pile is to stack sods or turf and manure in alternate layers, about 6 inches of soil and 3 inches of manure, allow the material to decay, then mix and screen. Synthetic manure or any form of animal manure may be used, but the proportions of poultry or other concentrated forms should be greatly reduced. It usually takes about a year for coarse material to decay sufficiently for use (fig. 2). Adding water from time to time to moisten the pile and spading or turning occasionally hasten the process of decay and produce a better mixture of the ingredients. Compost prepared this way serves admirably for use in hotbeds and coldframes, in flats for starting seeds and growing plants, for general potting purposes, and under and around certain plants in the garden (fig. 3). In making compost, care



Figure 3.—*Using soil-compost under and around plants in the garden.*

should be taken to see that the materials used are free from insects and diseases. Manure should contain no plant remains that are likely to transmit disease to the garden.

Commercial Fertilizers

Commercial fertilizers may be used to advantage in most farm gardens, the composition and rate of application depending on locality, soil, and

² Additional information on the preparation of compost and artificial manure is given in a mimeograph, *The Preparation of Potting Soil, Compost, and Artificial Manure*, which may be obtained from the Bureau of Plant Industry, Soils, and Agricultural Engineering, Plant Industry Station, Beltsville, Md.

crops to be grown. For general use, a fertilizer containing 5 percent nitrogen, 10 percent phosphoric acid, and 5 or 6 percent potash gives good results. On some soils with natural high fertility only nitrogen or manure may be needed. The use of fertilizers that also contain small amounts of copper, zinc, manganese, and other minor soil elements is necessary only in districts known to be deficient in those elements. State experiment station recommendations should be followed. Leafy crops, such as spinach, cabbage, kale, and lettuce, which often require more nitrogen than other garden crops, may be stimulated by side dressings of nitrate of soda, sulfate of ammonia, or ammonium nitrate. As a rule, the tuber and root crops, including potatoes, sweetpotatoes, beets, carrots, turnips, and parsnips, need a higher percentage of potash than other vegetables. Fertilizers for potatoes and sweetpotatoes commonly contain as much as 8 or 10 percent of potash, along with nitrogen and phosphoric acid.

The quantity of fertilizer to use depends on the natural fertility of the soil, the amounts of manure and fertilizer used in recent years, and the crops being grown. Tomatoes and beans, for example, normally require only moderate amounts of fertilizer, especially nitrogen; whereas onions, celery, lettuce, the root crops, and potatoes respond profitably to relatively large applications. In some cases 300 pounds of commercial fertilizer may be sufficient on a half-acre garden; in other cases as much as 1,000 to 1,200 pounds can be used to advantage.

Commercial fertilizers, as a rule, should be applied either a few days before planting or when the crops are planted. A good practice is to plow the land, spread the fertilizer from a pail or with a fertilizer distributor, then harrow the soil two or three times to get it in proper condition and at the same time mix the fertilizer with it. If the soil is left extremely rough by the plow, it should be harrowed once, lightly, before fertilizing. For row crops, like potatoes and sweetpotatoes, the fertilizer may be scattered in the rows, taking care to mix it thoroughly with the soil before the seed is dropped, or, in the case of sweetpotatoes, before the ridges are thrown up.

Application of the fertilizer in furrows along each side of the row at planting time does away with the danger of injury to seeds and plants that is likely to follow direct application of the material under the row. The fertilizer should be placed so that it will lie 2 to 3 inches to one side of the seed and at about the same level as, or a little lower than, the seed.

The roots of most garden crops spread to considerable distances, reaching throughout the surface soil. Fertilizer applied to the entire area, therefore, will be reached by the plants, but not always to best advantage. Placing fertilizer too near seedlings or young plants is likely to cause burning of the roots. Care is necessary also in

using nitrate of soda or sulfate of ammonia as a side dressing for growing crops. On a half-acre garden 75 to 100 pounds of any of the concentrated sources of nitrogen is sufficient for one application, and where only a part of the garden is treated the quantity should be regulated accordingly. The fertilizer should be sown alongside the rows and cultivated into the topsoil, taking care to keep it off the leaves so far as practicable.

Heavy yields of top-quality vegetables cannot be obtained without an abundance of available plant food in the soil. However, failure to bear fruit and even injury to the plants may result from the use of too much plant nutrient, particularly chemical fertilizers, or from an unbalanced nutrient condition in the soil. Because of the small quantities of fertilizer required for short rows and small plots it is easy to apply too much fertilizer. The chemical fertilizers to be applied should always be weighed or measured. Table 1 shows how much fertilizer to apply to each 50 or 100 feet of garden row or to each 100 to 2,000 square feet of garden area.

TABLE 1.—Approximate rates of fertilizer application per 50 or 100 feet of garden row, and per 100 to 2,000 square feet of garden area, corresponding to given rates per acre

| Measurement | Weight of fertilizer to apply when the weight to be applied per acre is— | | | |
|--|--|------------|------------|--------------|
| | 100 pounds | 400 pounds | 800 pounds | 1,200 pounds |
| Space between rows, and row length (feet): | | | | |
| 2 wide, 50 long..... | 0.25 | 1.0 | 2.0 | 3.0 |
| 2 wide, 100 long..... | .50 | 2.0 | 4.0 | 6.0 |
| 2½ wide, 50 long..... | .30 | 1.2 | 2.4 | 3.6 |
| 2½ wide, 100 long..... | .60 | 2.4 | 4.8 | 7.2 |
| 3 wide, 50 long..... | .35 | 1.4 | 2.8 | 4.2 |
| 3 wide, 100 long..... | .70 | 2.8 | 5.6 | 8.4 |
| Area (square feet): | | | | |
| 100..... | .25 | 1.0 | 2.0 | 3.0 |
| 500..... | 1.25 | 5.0 | 10.0 | 15.0 |
| 1,000..... | 2.50 | 10.0 | 20.0 | 30.0 |
| 1,500..... | 3.75 | 15.0 | 30.0 | 45.0 |
| 2,000..... | 5.00 | 20.0 | 40.0 | 60.0 |

If it is more convenient to measure the material than to weigh it, pounds of a common garden fertilizer, such as 5-10-5, 4-8-4, superphosphate, ammonium phosphate, or muriate of potash, may be converted roughly to pints or cups by allowing 1 pint, or 2 kitchen measuring cups, to a pound. For example, table 1 gives 0.25 pound for a 100-pound-per-acre application to 100 square feet. This would call for about ¼ pint, or ½ cup, of fertilizer.

Granular sodium nitrate and ground limestone weigh about 1½ times as much as the same volumes of water; therefore, measured quantities of these materials should be about one-fourth less than those calculated as equivalent to the weights in the table. For example, ¾ pint of ground limestone weighs about 1 pound. Ammonium sulfate and granular ammonium nitrate are much lighter, weighing about seven-tenths as much as the same volumes of water; therefore, volumes of these sub-

stances calculated by the foregoing method should be increased by about one-third.³

Liming

Lime, ground limestone, marl, or ground oyster-shells on garden soils serves a threefold purpose: (1) To supply calcium and other plant nutrients; (2) to reduce soil acidity; (3) to improve the physical character of certain heavy soils. As a rule, asparagus, celery, beets, spinach, and carrots are benefited by moderate applications of lime, especially on soils that are naturally deficient in calcium. Dolomitic limestone should be used on soils deficient in magnesium. Most garden vegetables do best on soils that are slightly acid and may be injured by the application of lime in excess of their requirements. For this reason lime should be applied only when tests show it to be necessary. In no case should the material be applied in larger quantities than the test indicates. Most garden soils that are in a high state of fertility do not require the addition of lime.

With good drainage, plenty of manure in the soil, and the moderate use of commercial fertilizers, the growth requirements of nearly all vegetables may be fully met. The local garden leader, county agent, or State experiment station can supply information on soil tests that can be made for each locality. (Samples of soil should not be sent to the U. S. Department of Agriculture.)

Lime, when needed, is spread after plowing and is well mixed with the topsoil by harrowing, disking, or cultivating. Burned lime or hydrated lime should not be applied at the same time as manure or commercial fertilizers or mixed with them, because loss of nitrogen is likely to result, thus destroying part of the plant nutrient value. As a rule, lime should be applied in the spring, because some of it may be washed from the soil during winter. Any of the various forms of lime, such as hydrated and air-slacked lime, may be used, but the unburned, finely ground, dolomitic limestone is best. Fifty-six pounds of burned lime or 74 pounds of hydrated lime is equivalent to 100 pounds of ground limestone. Finely ground oyster-shells and marl are frequently used as substitutes for limestone. Lime should not be used on land that is being planted to potatoes unless the soil is extremely acid, because very low soil acidity increases the development of potato scab.

Soil Preparation

The time and method of preparing the garden

for planting depend on the type of soil and the location. Heavy clay soils in the northern sections are frequently benefited by fall plowing and exposure to freezing and thawing during the winter, but when the garden is cover-cropped, it should not be plowed until early spring. In general, garden soils should be cover-cropped during the winter to control erosion and to add organic matter. Gardens in the dry-land areas should be plowed and left rough in the fall, so that the soil will absorb and retain moisture that falls during the winter. Sandy soils, as a rule, should be cover-cropped, then spring-plowed. Whenever there is a heavy sod or growth of cover crop, the land should be plowed well in advance of planting and the soil disked several times to aid in the decay and incorporation of the material. Land receiving applications of coarse manure either before or after plowing should have the same treatment.

Soils should not be plowed or worked while wet unless the work will certainly be followed by severe freezing weather. Sandy soils and those containing high proportions of organic matter—peats and mucks for example—bear plowing and working at higher moisture content than do heavy clay soils. The usual test is to squeeze together a handful of soil. If it sticks together in a ball and does not readily crumble under slight pressure by the thumb and finger, it is too wet for plowing or working. When examining soil to determine if it is dry enough to work, samples should be taken both at and a few inches below the surface. The surface may be dry enough, but the lower layers too wet, for working. Soil that sticks to the plow or to other tools is usually too wet. A shiny, unbroken surface of the turned furrow is another indication of a dangerously wet soil condition.

Fall-plowed land should be left rough until spring, when it may be prepared by disking, harrowing, or other methods. Spring-plowed land should be worked into a suitable seedbed immediately after plowing. Seeds germinate and plants grow more readily on a reasonably fine, well-prepared soil than on a coarse, lumpy one, and thorough preparation greatly reduces the work of planting and caring for the crops. It is possible, however, to overdo the preparation of some heavy soils. They should be brought to a somewhat granular rather than a powdery-fine condition for planting. Spading instead of plowing is sometimes advisable in preparing small areas, such as beds for extra-early crops of lettuce, onions, beets, and carrots.

Equipment

Most country gardeners have the use of regular farm equipment for the preparation of garden

soils. Tractor- or horse-drawn plows, harrows, and other implements suitable for large-scale farming operations, however, are often cumbersome in the average-size garden, and there is danger that unplowed corners, deep middle furrows,

³ For more complete information on calculating rates of application for fertilizer, see U. S. Department of Agriculture Leaflet 307, *How Much Fertilizer Shall I Use?*

and other inequalities may result from their use. The advent of power tools with mechanical lifts that make it possible to back into corners has done much to improve the quality of the work in the garden.

Many gardeners who do little or no farming have the choice of hiring equipment for garden-land preparation or buying their own. Equipment for hire too often is unavailable when needed, so that a favorable season for planting may be missed. Country gardeners, in increasing numbers, are turning to small farm and garden tractors for land preparation, cultivation, lawn mowing, and hauling sprayers in gardens and orchards. Those who garden every year and who have large homesteads usually find this equipment a good investment. The size and type of equipment needed depend on the amount of work to be done, the contour of the land, and the character of the soil. For cultivating and other light work a 2- to 3-horsepower tractor (fig. 4) is used. If plowing or other heavy work is involved, a larger tractor is desirable. Modern outfits of this size are well adapted to cultivating small areas. A me-

dium-size tractor suitable for cultivating a large garden (fig. 5) can also be used for plowing.

The rotary tiller, which is capable of preparing light to medium soils for planting in one operation, has been widely adopted by gardeners who have such soils. In the hands of a careful operator and on land that is not too hard and heavy and is reasonably free from stones, roots, and other obstructions, this machine has many desirable features. It can be adjusted to cultivate very shallowly or to plow the soil and fit it for planting. Tools such as sweeps may be attached, thereby adapting the machine to straddle-row cultivating (fig. 6).

Use of well-adapted implements in preparing garden land greatly lessens the work required in cultivating. Clean, sharp, high-grade tools greatly lessen garden labor. Indispensable hand tools include a hoe, a steel rake, a spade or spading fork, a bucket or a watering can, a stout garden line, and a hand duster or sprayer. Except for very small gardens, a wheel hoe is necessary and a wheelbarrow is desirable. For larger gardens, a wheel-type hand fertilizer distributor, a sprayer



Figure 4.—Cultivating with garden tractor.



Figure 5.—Medium-size farm tractor suitable for plowing and cultivating. Note attachment for applying fertilizer.



Figure 6.—Preparing garden land with a power tiller, which is breaking land and pulverizing it to a depth of 6 inches.

or duster (preferably a wheelbarrow-type power sprayer), and a seed drill are generally profitable. Minor tools include two pointed iron stakes and weeders.

If sufficient water is available, irrigation equipment is necessary in many areas and highly desirable in nearly all gardens. Furrow application requires careful planning and laying out of the garden area and precise handling of the soil to insure even distribution of water. Overhead pipes with nozzles at short intervals, temporary lines of lightweight pipe with rotating sprinklers, and porous hose laid along the rows are extensively used. The most common practice is to use a length or two of garden hose, with or without sprinklers, fed by faucets on temporary or permanent lines of pipe through the garden.

Plan and Arrangement

No one plan or arrangement for a garden can suit all conditions. Each grower must plan to meet his own problem. Careful planning will lessen the work of gardening and increase the returns from the labor. Planting seeds and plants at random always results in waste and disappointment. Suggestions for planning a garden are here presented with the idea that they can be changed to suit the individual gardener. Figure 7 shows a plan for a half-acre garden. A garden of this size should produce an ample year's supply of vegetables for a large family.

The first consideration is whether the garden is to be in one unit or in two. With two plots, lettuce, radishes, beets, spinach, and other vegetables requiring little space are grown in a small kitchen garden, and potatoes, sweet corn, pumpkins, melons, and other vegetables requiring more room are planted in a separate patch, as between young-orchard-tree rows or in other areas where conditions are especially suitable for their culture.

The cultivation methods to be employed are important in planning the garden. When the work is to be done mainly with horse- or tractor-drawn tools, the site and the arrangement should be such as to give the longest practicable rows. On slopes of more than $1\frac{1}{2}$ percent, especially on light-textured soil, the rows should extend across the slope at right angles to it, or on the contours where the land is uneven. The garden

should be free from paths across the rows, and turning spaces of 10 to 12 feet should be provided at the ends. The rows for small-growing crops may be closer together for hand cultivation than for cultivation with horse or power equipment. Horse or tractor cultivation, however, materially lessens the labor and cost of caring for the crops.

Any great variation in the composition of the soil within the garden should be taken into consideration when deciding on where to plant various crops. If part of the land is low and moist, such crops as celery, onions, and late cucumbers should be placed there. If part is high, warm, and dry, that is the proper spot for early crops, especially those needing a soil that warms up quickly.

Permanent crops, such as asparagus and rhubarb, should be planted where they will not interfere with the annual plowing of the garden and the cultivation of the annual crops. If a hot-bed, a coldframe, or a special seedbed is provided, it should be either in one corner of, or outside, the garden.

Tall-growing crops should be planted where they will not shade or interfere with the growth of smaller crops. There seems to be little choice as to whether the rows do or do not run in a general east-and-west or in a general north-and-south direction, but they should conform to the contours of the land.

| NOTED | COLD FRAME | SEED BED | 1 | RHUBARB | HORSE RADISH | FRENCH OR BURR ARTICHOKES | HERBS |
|-------|------------|----------|---|---|-------------------------------|---------------------------------|-------|
| | | | 2 | ASPARAGUS | | | |
| 3 | | | | PARSNIPS | | CARROTS | |
| 4 | | | | SALSIFY AND SIMILAR LONG-SEASON CROPS | | | |
| 5 | | | | BEETS | PEPPERS | EGGPLANT | |
| 6 | | | | LETTUCE (FOLLOWED BY CELERY) | RADISHES (FOLLOWED BY CELERY) | ONION SETS (FOLLOWED BY CELERY) | |
| 7 | | | | EARLY BEANS (FOLLOWED BY CELERY) | | | |
| 8 | | | | EARLY PEAS (FOLLOWED BY CELERY) | | | |
| 9 | | | | LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIPLIER OR POTATO ONIONS) | | | |
| 10 | | | | LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIPLIER OR POTATO ONIONS) | | | |
| 11 | | | | LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIPLIER OR POTATO ONIONS) | | | |
| 12 | | | | LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIPLIER OR POTATO ONIONS) | | | |
| 13 | | | | EARLY CABBAGE (FOLLOWED BY LATE PEAS AND BEANS) | | | |
| 14 | | | | EARLY CABBAGE (FOLLOWED BY LATE PEAS AND BEANS) | | | |
| 15 | | | | TOMATOES (PLANTS 4 FEET APART IN ROW) | | | |
| 16 | | | | TOMATOES (PLANTS 4 FEET APART IN ROW) | | | |
| 17 | | | | OKRA, NEW ZEALAND SPINACH AND MISCELLANEOUS VEGETABLES | | | |
| 18 | | | | CUCUMBERS | MELONS | SQUASHES | |
| 19 | | | | EARLY POTATOES (FOLLOWED BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING) | | | |
| 20 | | | | EARLY POTATOES (FOLLOWED BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING) | | | |
| 21 | | | | EARLY POTATOES (FOLLOWED BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING) | | | |
| 22 | | | | EARLY POTATOES (FOLLOW BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING) | | | |
| 23 | | | | EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS) | | | |
| 24 | | | | EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS) | | | |
| 25 | | | | EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS) | | | |
| 26 | | | | EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS) | | | |
| 27 | | | | SWEET POTATOES OR PUMPKINS | | | |
| 28 | | | | SWEET POTATOES OR PUMPKINS | | | |
| 29 | | | | LIMA AND OTHER POLE BEANS | | | |

Figure 7.—Plan of a half-acre garden: Length, 200 feet; width, 100 feet. A half-acre garden should produce all the vegetables the large family can use throughout the growing season and a surplus for canning, storing, and drying.

Succession of Crops

Except in dry-land areas, all garden space should be kept fully occupied throughout the growing season. In the South, this means the greater part of the year. In fact, throughout the South Atlantic and Gulf coast regions it is possible to have vegetables growing in the garden every month of the year.

In arranging the garden, all early-maturing crops may be grouped so that as soon as one crop is removed another takes its place. It is desirable, however, to follow a crop not with another of its kind, but with an unrelated crop. For example, early peas or beans can very properly be followed by late cabbage, celery, carrots, or beets; early corn or potatoes can be followed by fall turnips or spinach. It is not always necessary to wait until the early crop is entirely removed; a later one may be planted between the rows of the early crop—for example, sweet corn between potato rows. Crops subject to attack by the same diseases and insects should not follow each other.

Except in special cases, it pays the gardener to buy seed from reputable seedsmen and not to depend on home-grown supplies. Very fine varieties that do extremely well in certain areas have been grown for long periods from locally produced seed, and such practices are to be commended, provided adequate measures are taken to keep the strains pure.

Vegetables that are entirely, or readily, cross-pollinated *among plants of their kind* include corn, cucumbers, melons, squash, pumpkins, cress, mustard, brussels sprouts, cabbage, cauliflower, collards, kale, kohlrabi, spinach, onion, radish, beet, and turnip. Those less readily cross-pollinated are eggplant, pepper, tomato, carrot, and celery. Beans, peas, okra, and lettuce are generally self-pollinated, but occasionally cross-pollinated, lima beans sometimes rather extensively. Because sweet corn will cross with field corn, it is unwise to save sweet corn seed if field corn is growing in the same neighborhood. Hybrid sweet corn should not be saved for seed. The custom of saving seed from a choice watermelon is safe, provided no citrons or other varieties of watermelons are growing nearby. Likewise, seed from a muskmelon is safe, even though it was grown side by side with cucumbers. Beans do not readily cross and their seed also may be saved, but it must be fumigated to prevent weevil damage. Cabbage, kohlrabi, kale, collards, broccoli, and cauliflower all intercross freely, so each must be well isolated from the others if seed is to be saved.

Seeds should be ordered well in advance of planting time, but only after the preparation of a garden plan that shows the size of the plantings

In the extreme North, where the season is relatively short, there is very little opportunity for succession cropping. In dry-land areas, intercropping generally is not feasible, because of limited moisture supply. Therefore, plenty of land should be provided to accommodate the desired range and volume of garden crops.

Late-Summer and Fall Garden

Although gardening is commonly considered mainly as a spring and early-summer enterprise, the late-summer and fall garden deserves attention too. Second and third plantings of crops adapted to growing late in the season not only provide a supply of fresh vegetables for the latter part of the season but often give better products for canning, freezing, and storing. Late-grown snap and lima beans and spinach, for example, are well adapted to freezing and canning; beets, carrots, celery, and turnips, to storage. In the South, the late-autumn garden is as important as the early-autumn one.

Seed

and the quantity of seed required. Table 2 shows the quantity of seed required for a given space, but allowance should be made for the possible need of replanting. Crops and varieties that are known to be adapted to the locality should be selected. The agricultural experiment station of each State, county agricultural agents, and experienced gardeners are usually able to give advice about varieties of vegetables that are adapted to the area. Standard sorts of known quality and performance are usually the best choice.

Disease-resistant strains and varieties of many important vegetables are now so generally available that there is little reason for risking the loss of a crop through planting susceptible sorts. This phase of the subject is treated in detail under the individual crops (pp. 19 to 47).

Vegetable seeds purchased for use in the current season require little attention except that they should be stored where they will be dry and safe from rodents. Most seeds kept from one season to the next must be fumigated to prevent insect attack, kept dry, and protected from damage by rodents. Carbon disulfide fumigation once or twice each season prevents insect damage. Carbon disulfide is a liquid that can be purchased at any drug store. When poured into a shallow vessel, it evaporates rapidly, producing a foul-smelling gas that is heavier than air and highly inflammable. In fumigating seeds it is necessary to place the carbon disulfide on top of the seeds in order that the gas may sink into them and reach every part of the container. A tight open-end drum or a large ashcan makes an ideal container for fumigating seeds.

TABLE 2.—Quantity of seed and number of plants required for 100 feet of row, depths of planting, and distances apart for rows and plants

| Crop | Requirement for 100 feet of row | | Depth for planting seed | Distance apart | | |
|------------------------|---------------------------------|---------|-------------------------|------------------------------|-----------------|---|
| | Seed | Plants | | Rows | | Plants in the row |
| | | | | Horse- or tractor-cultivated | Hand-cultivated | |
| Asparagus | 1 ounce | 75 | Inches 1 -1½ | Feet 4 -5 | 1½ to 2 feet | 18 inches. |
| Beans: | | | | | | |
| Lima, bush | ½ pound | | 1 -1½ | 2½-3 | 2 feet | 3 to 4 inches. |
| Lima, pole | do | | 1 -1½ | 3 -4 | 3 feet | 3 to 4 feet. |
| Snap, bush | do | | 1 -1½ | 2½-3 | 2 feet | 3 to 4 inches. |
| Snap, pole | 4 ounces | | 1 -1½ | 3 -4 | do | 3 feet. |
| Beet | 2 ounces | | 1 | 2 -2½ | 14 to 16 inches | 2 to 3 inches. |
| Broccoli: | | | | | | |
| Heading | 1 packet | 50-75 | ½ | 2½-3 | 2 to 2½ feet | 14 to 24 inches. |
| Sprouting | do | 50-75 | ½ | 2½-3 | do | Do. |
| Brussels sprouts | do | 50-75 | ½ | 2½-3 | do | Do. |
| Cabbage | do | 50-75 | ½ | 2½-3 | do | Do. |
| Cabbage, Chinese | do | | ½ | 2 -2½ | 18 to 24 inches | 8 to 12 inches. |
| Carrot | do | | ½ | 2 -2½ | 14 to 16 inches | 2 to 3 inches. |
| Cauliflower | do | 50-75 | ½ | 2½-3 | 2 to 2½ feet | 14 to 24 inches. |
| Celeriac | do | 200-250 | ½ | 2½-3 | 18 to 24 inches | 4 to 6 inches. |
| Celery | do | 200-250 | ½ | 2½-3 | do | Do |
| Chard | 2 ounces | | 1 | 2 2½ | do | 6 inches. |
| Chervil | 1 packet | | ½ | 2 -2½ | 14 to 16 inches | 2 to 3 inches. |
| Chicory, witloof | do | | ½ | 2 -2½ | 18 to 24 inches | 6 to 8 inches. |
| Chives | do | | ½ | 2½-3 | 14 to 16 inches | In clusters. |
| Collards | do | | ½ | 3 -3½ | 18 to 24 inches | 18 to 24 inches. |
| Cornsalad | do | | ½ | 2½-3 | 14 to 16 inches | 1 foot. |
| Corn, sweet | 2 ounces | | 2 | 3 3½ | 2 to 3 feet | Drills, 14 to 16 inches; hills, 2½ to 3 feet. |
| Cress: | | | | | | |
| Upland | 1 packet | | ½-¾ | 2 -2½ | 14 to 16 inches | 2 to 3 inches. |
| Water | do | | ¾-1 | 2 -2½ | 18 to 24 inches | 4 to 6 inches. |
| Cucumber | do | | ½ | 6 -7 | 6 to 7 feet | Drills, 3 feet; hills, 6 feet. |
| Dandelion | do | | ½ | 2½-3 | 14 to 16 inches | 8 to 12 inches. |
| Dasheen | 5 to 6 pounds | 50 | 2 -3 | 3½-4 | 3½ to 4 feet | 2 feet. |
| Eggplant | 1 packet | 50 | ½ | 3 | 2 to 2½ feet | 3 feet. |
| Endive | do | | ½ | 2½-3 | 18 to 24 inches | 12 inches. |
| Fennel, Florence | do | | ½ | 2½-3 | do | 4 to 6 inches. |
| Garlic | 1 pound | | 1 -2 | 2½-3 | 14 to 16 inches | 2 to 3 inches. |
| Horseradish | Cuttings | 50-75 | 2 | 3 -4 | 2 to 2½ feet | 18 to 24 inches. |
| Kale | 1 packet | | ½ | 2½-3 | 18 to 24 inches | 12 to 15 inches. |
| Kohlrabi | do | | ½ | 2½-3 | 14 to 16 inches | 5 to 6 inches. |
| Leek | do | | ½-1 | 2½-3 | do | 2 to 3 inches. |
| Lettuce, head | do | 100 | ½ | 2½-3 | do | 12 to 15 inches. |
| Lettuce, leaf | do | | ½ | 2½-3 | do | 6 inches. |
| Muskmelon | do | | 1 | 6 -7 | 6 to 7 feet | Hills, 6 feet. |
| Mustard | do | | ½ | 2½-3 | 14 to 16 inches | 12 inches. |
| Okra | 2 ounces | | 1 -1½ | 3 -3½ | 3 to 3½ feet | 2 feet. |
| Onion: | | | | | | |
| Plants | | 400 | 1 -2 | 2 -2½ | 14 to 16 inches | 2 to 3 inches. |
| Seed | 1 packet | | ½-1 | 2 -2½ | do | Do. |
| Sets | 1 pound | | 1 -2 | 2 -2½ | do | Do. |
| Parsley | 1 packet | | ½ | 2 -2½ | do | 4 to 6 inches. |
| Parsley, turnip-rooted | do | | ½-¾ | 2 -2½ | do | 2 to 3 inches. |
| Parsnip | do | | ½ | 2 -2½ | do | Do. |
| Peas | ½ pound | | 2 -3 | 2 -4 | 18 to 24 inches | 1 inch. |
| Pepper | 1 packet | 50-70 | ½ | 3 -4 | 1½ to 3 feet | 18 to 24 inches. |
| Physalis | do | | ½ | 2 -2½ | 2 to 3 feet | 12 to 18 inches. |
| Poke | do | 25-40 | ½-1 | 3 -3½ | 1½ to 2 feet | 3 feet. |
| Potato | 5 to 6 pounds | | 4 | 2½-3 | 3 to 3½ feet | 3 feet. |
| Pumpkin | 1 ounce | | 1 -2 | 5 -8 | 2 to 2½ feet | 10 to 18 inches. |
| Radish | 1 ounce | | ½ | 2 -2½ | 5 to 8 feet | 3 to 4 feet. |
| Rhubarb | do | 25-35 | ½ | 2 -2½ | 14 to 16 inches | 1 inch. |
| Salsify | 1 ounce | | ½ | 3 -4 | 3 to 4 feet | 3 to 4 feet. |
| Shallots | 1 pound (cloves) | | 1 -2 | 2 -2½ | 18 to 26 inches | 2 to 3 inches. |
| Sorrel | 1 packet | | ½ | 2 -2½ | 3 to 4 feet | Do. |
| Soybean | ½ to 1 pound | | 1 -1½ | 2½-3 | 12 to 18 inches | 5 to 8 inches. |
| Spinach | 1 ounce | | ½ | 2 -2½ | 24 to 30 inches | 3 inches. |
| Spinach, New Zealand | do | | 1 -1½ | 2 -2½ | 14 to 16 inches | 3 to 4 inches. |
| Squash: | | | | | | |
| Bush | ½ ounce | | 1 -2 | 4 -5 | 3 feet | 18 inches. |
| Vine | 1 ounce | | 1 -2 | 8 -12 | 4 to 5 feet | Drills, 15 to 18 inches; hills, 4 feet. |
| Sweetpotato | 5 pounds | 75 | 2 -3 | 3 -3½ | 8 to 12 feet | Drills, 2 to 3 feet; hills, 4 feet. |
| Tomato | 1 packet | 35-50 | ½ | 3 -4 | 3 to 3½ feet | 12 to 14 inches. |
| Turnip greens | do | | ¼-½ | 2 -2½ | 2 to 3 feet | 1½ to 3 feet. |
| Turnips and rutabagas | ½ ounce | | ¼-½ | 2 -2½ | 14 to 16 inches | 2 to 3 inches. |
| Watermelon | 1 ounce | | 1 -2 | 8 -10 | do | Do. |
| | | | | | 8 to 10 feet | Drills, 2 to 3 feet; hills, 8 feet. |

A half cupful of the disulfide is sufficient for a tight 40- to 50-gallon drum filled loosely with cloth bags of seeds. The drum or barrel should be tightly closed by tying a canvas over the top, after the disulfide has been placed on top of the seed bags. The cover should remain in position for 1 to 2 days, after which ventilation is desirable.

Carbon disulfide is a fire and explosion hazard. Do not use indoors. Inhaling the fumes can be harmful. It is safer to use a mixture of 60 percent carbon dichloride and 40 percent carbon tetrachloride.

Some seeds retain their vitality longer than others. Seeds may be divided into three groups

as follows: (1) Comparatively short-lived, usually not good after 1 to 2 years—corn, leek, onion, parsley, parsnip, rhubarb, and salsify; (2) moderately long-lived, often good for 3 to 5 years—asparagus, beans, brussels sprouts, cabbage, carrot, cauliflower, celery, kale, lettuce, okra, peas, pepper, radish, spinach, turnip, and watermelon; and (3) long-lived, may be good for more than 5 years—beet, cucumber, eggplant, muskmelon, and tomato.

Seed decay and damping-off after planting can be controlled by treating the seeds with various chemical compounds. Semesan, an organic mercury compound, can be used on all vegetable seeds except lima beans. Red copper oxide (Cuprocide) is commonly used to control damping-off, but it must not be used on seeds of cabbage and related plants, onions, or lima beans. Spergon and Arasan contain no mercury or copper and

may be used on practically all vegetable seeds for the prevention of seed decay and damping-off.

Some seed-borne organisms often can be controlled by treating the seed with a corrosive sublimate solution, as follows:

Cucumber, muskmelon, and watermelon: Soak seed 5 minutes in a 1:1,000 solution.

Eggplant: Soak seed 10 minutes in a 1:1,000 solution.

Pepper: Soak seed 2 minutes in a 1:1,000 solution.

Tomato: Soak seed 5 minutes in a 1:2,000 solution.

After treating as directed, wash the seed for 15 minutes and thoroughly dry at a low temperature.

Caution: Seeds that have been treated with a fungicide should not be stored in tight containers for use during subsequent seasons. Their vitality may be damaged.

Plants

Table 2 gives in general the proper depth of planting for seed of the various vegetables, the quantity of seed or number of plants required for 100 feet of row, and the correct spacing of rows and of plants within the row. Special planting suggestions are given in the cultural hints for the various garden crops (pp. 19 to 47).

Earliness, economy of garden space, and lengthening of the growing season may be obtained by setting the plants of many vegetables instead of sowing the seed directly in the garden. Moreover, it is almost impossible to establish good stands from seed sown directly in place in the garden with delicate plants, such as celery, under average conditions.

In the warmer parts of the United States, practically all vegetable plants may be started in specially prepared beds in the open with little or no covering. In the temperate and colder regions, if an early garden is desired, it is essential that certain crops, such as tomatoes, peppers, eggplant, early cabbage, cauliflower, and early head lettuce, be started indoors, in hotbeds, or in coldframes. Occasionally onion, beet, cucumber, squash, and melons are started under cover and transplanted.

Treating Seedbed and Potting Soil

Seedbed and potting soil should be sterilized if there is reason to suspect that it contains harmful insects or disease-producing organisms. Very small lots can be treated by placing the moist soil in a shallow pan and baking it for an hour in an oven at a temperature of 210° to 215° Fahrenheit. This treatment not only controls most diseases that might be present, it also kills insects and many weed seeds. Another way to accomplish the same result is to place the soil in a canning retort and steam-sterilize it for a half hour at

a pressure of about 15 pounds.⁴ After sterilization the material should be allowed to stand for 2 to 3 weeks before seeds or plants are placed in it, because the heat treatment produces a temporarily harmful condition in the soil.

Chemical sterilization of potting and garden soil is extensively practiced. Formaldehyde and chloropicrin (tear gas) are used as fungicides; Dowfume W, D-D, and Iscobrome are extensively used to control nematodes and some insects. In using formaldehyde, a solution of 1 pint of commercial (37-percent) formaldehyde in 3¾ gallons of water is sprinkled on the compost-soil mixture at the rate of 1 quart to each square foot, 6 inches deep. The mixture may be spread on an outdoor platform or in a box—treated, watered heavily, and then covered with a piece of heavy cloth for 48 hours. As soon as the soil-compost is sufficiently dry it should be stirred and turned to hasten the escape of the gas. The soil-compost must be allowed to stand for about 2 weeks before planting. Formaldehyde must never be used where the vapor will reach plants, because it will injure or kill them.

Formaldehyde is an irritating poison. It must be used with care and kept away from irresponsible persons.

The other materials are liquid chemicals that have proved generally effective for the purposes indicated. In using them, manufacturers' directions should be carefully followed. The vapors of chloropicrin, Dowfume W, and D-D are very poisonous to plants; they should not be used where the fumes will reach them. As many as 20 days may be required to free the treated soil of the

⁴Complete information on this and other methods of soil sterilization is given in Farmers' Bulletin 1629, Steam Sterilization of Soil for Tobacco and Other Crops.

fumes. Planting is unsafe as long as any fumes are present. Storing the soil in a shallow layer where the temperature is high and occasional stirring will hasten the escape of the gas. Iscobrome can be used safely if there is good ventilation adjacent to plants; treated soil may be safely planted within 5 to 10 days.

Starting Plants in the House

Seeds can be germinated and seedlings started in a box, pan, or flowerpot of soil in a window. In addition to having at least 6 hours direct sunlight each day, the room must be kept reasonably warm at all times. Soil for starting seedlings should be prepared and treated as described on page 12. Ten to twenty days after sowing, or when the first true leaves appear, the plants should be transplanted to other containers (fig. 8) where they will have more room, as described on page 16.



Figure 8.—Seed box (top) and flat used for starting and transplanting seedlings.

It is seldom possible to keep the transplanted plants in house windows without their becoming spindling and weak. A hotbed, coldframe, or other place where they will receive an abundance of sunshine, ample ventilation, and a suitable temperature for healthy growth is necessary.

Special Devices for Starting Plants

In determining the type of equipment for starting early plants, the gardener must consider the temperature and other climatic conditions in his locality, as well as the nature of the plants to be started. Hardy plants, such as cabbage, need only simple inexpensive facilities, but such heat-loving, tender seedlings as peppers and eggplant must have more elaborate facilities for successful production. In the warmer parts of the United States, and in well-protected locations elsewhere, a coldframe or a sash-covered pit on the sunny side of a building usually suffices (fig. 9). In



Figure 9.—Growing early plants in a coldframe located on the south side of the house. Some heat is supplied from the basement window.

colder sections, or in exposed areas elsewhere, some form of artificial heat is essential. Where only a little protection against cold damage, at infrequent intervals, is needed a coldframe in which a temporary bank of lamps can be placed may be sufficient. The hotbed, lean-to, or sash greenhouse heated by manure, pipes, flues, or electricity are all widely used, the choice depending on conditions. A comparatively small plant-growing structure will provide enough plants for several gardens, and joint efforts by a number of gardeners will usually reduce the labor of producing plants.

The plant-growing structure should always be on well-drained land free from danger by flooding. A sunny, southern exposure on a moderate slope, with trees, a hedge, a board fence, or other form of windbreak on the north and west, makes a desirable site. Plenty of sunshine is necessary.

Hotbeds and other plant-growing devices require close attention. They must be ventilated at frequent intervals, and the plants may require watering more than once daily. Convenience in handling the work is important. Sudden storms may necessitate closing the structure within a matter of minutes. Plant growing at home should not be undertaken by persons obliged to be away for extended periods, leaving the plant structure unattended.

Hotbeds and Coldframes

Building a Hotbed

A tight well-glazed structure is necessary where the climate is severe; less expensive facilities are satisfactory elsewhere.

Where fresh horse manure is plentiful, a temporary hotbed may be provided by piling manure flat, 12 to 24 inches deep, on top of the ground in a well-drained place and setting a frame of

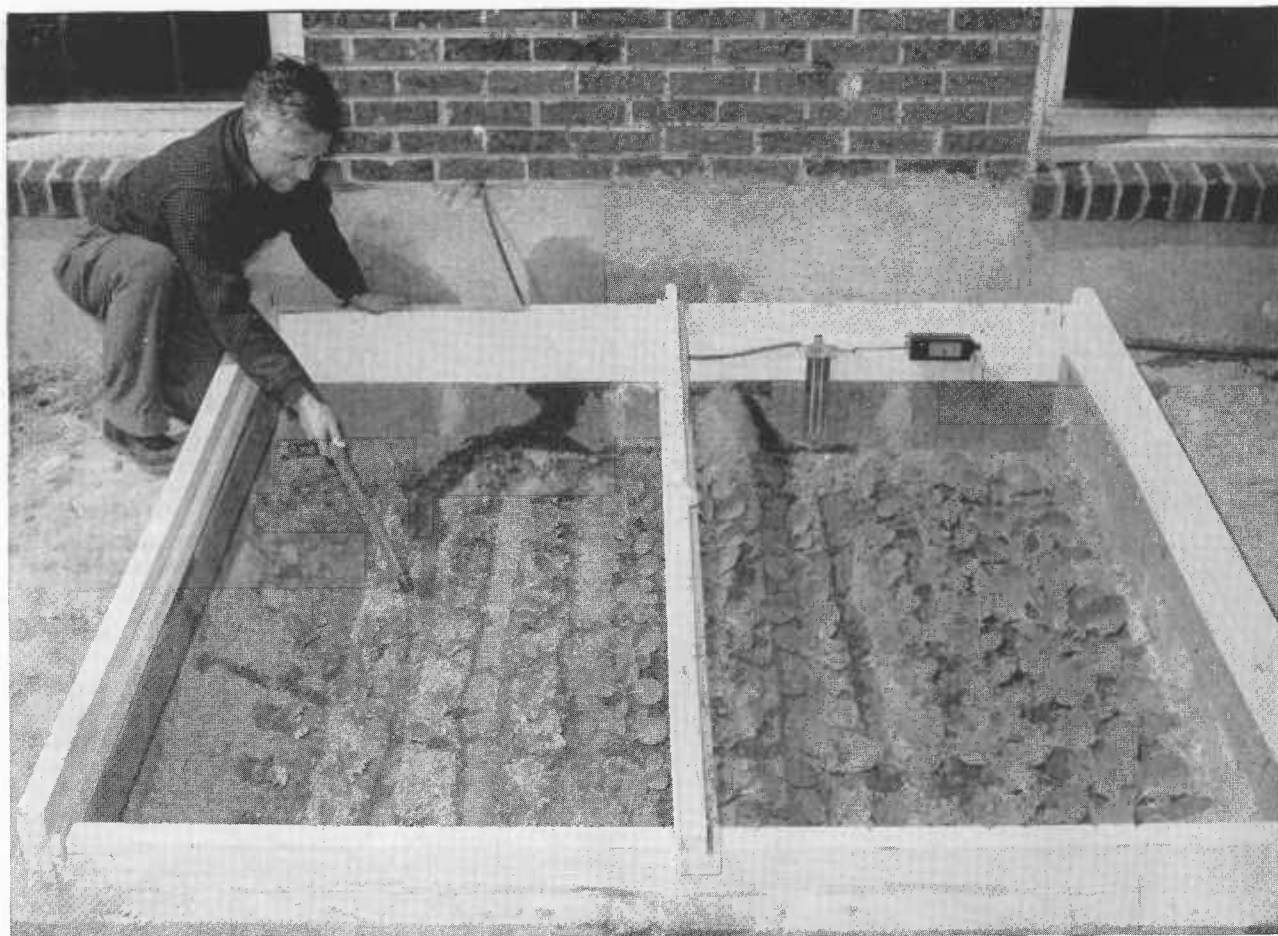


Figure 10.—An electrically heated hotbed with thermostatic control is ideal for the home gardener.

boards on top of it to contain the soil and support the covering. Additional manure is banked around the outside of the frame to retain heat.

A permanent type of manure-heated hotbed may be provided by digging a pit 12 to 18 inches deep, walling it with cinder blocks, bricks, or planks, and setting the frame on the walls. The layer of manure need not be as thick as for the above-ground bed. A fresh lot of manure is necessary for each lot of plants to be grown, because the material loses its heat-producing quality within a few weeks.

Following the placing of the manure in the pit (or the frame on top of the flat pile of manure), about 5 inches of screened garden loam is spread evenly over the manure and the covering is put on to retain the heat. When a manure-heated bed is first made it is likely to heat rapidly to a temperature too high for good plant growth. Therefore, seed sowing should be deferred until the temperature of the soil has dropped to 85° F. or a little lower. A good soil thermometer is essential.

Finely chopped and moistened cornstalks packed into the hotbed pit in exactly the same

manner as horse manure provide a fair substitute. The fermentation supplies enough heat for plant growth. Cattle manure is not satisfactory for hotbed use.

Covers for Hotbeds and Coldframes

Covers for hotbeds and coldframes may be glass sash, various kinds of glass substitutes, or cloth, such as muslin or light canvas.

In the moderate and cooler sections of the country, standard 3- by 6-foot hotbed sash is most satisfactory. Even this requires supplementary covering with canvas, blankets, mats, or similar material during freezing weather. The amount of covering is determined by the degree of heat supplied the structure, the severity of the weather, and the kind of plants and their stage of development. Farther South, where less protection is necessary, a muslin cover may be all that is needed and for only a part of the time. Preservatives may make the cloth cover practically waterproof and add to its life. A mixture of 2 to 3 pounds of melted paraffin, $\frac{1}{2}$ pound of melted beeswax, and 1 gallon of benzene, applied to the cloth either as a spray or with a brush, makes the fabric water-

proof and at the same time preserves it. Commercial preparations may be used instead of this mixture.

Many substitutes for glass as coverings for hotbeds and coldframes are on the market. Compared with glass, the total light-transmitting capacity of these substitutes is relatively low, but they may be employed to excellent advantage for hotbeds and coldframes in regions having a mild climate, where covering is needed primarily at night and on occasional cold windy days. Under these conditions the amount of light transmitted is less important. The materials are easily applied to lightweight sashes, which are convenient to handle. Compared with glass, the substitutes are relatively short-lived, but, of course, glass is short-lived too unless handled carefully.

Electrically Heated Plant Beds

Electrically heated plant beds are ideal for the home gardener, provided electric rates are not too high. The beds may be built any size. Because they are equipped with thermostatic control, they require a minimum of attention. It is now possible to buy completely equipped frames with the necessary heating cables, switches, and thermostat ready to assemble and set in position—to fill with soil or plant boxes—and connect to a source of current (fig. 10). Small frames may be removed at the end of the season and stored; larger frames are usually treated as a permanent installation.⁵

Hardening Plants

Plants should be gradually hardened, or toughened, for 2 weeks before planting in the open garden. This is done by slowing down their rate of growth to prepare them to withstand such conditions as chilling, drying winds, shortage of water, or high temperatures. Cabbage, lettuce, onion, and many other plants can be hardened to withstand frost; others, such as tomatoes and peppers, cannot. Withholding water and lowering the temperature are the best ways to harden a plant. This may be done in a coldframe (fig. 11).

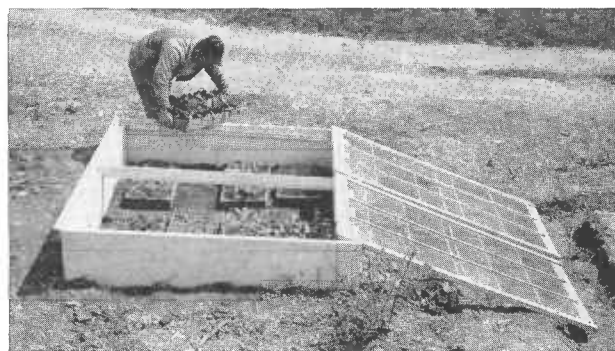


Figure 11.—Hardening early plants in a coldframe.



Figure 12.—Blocking out cabbage by cutting through the soil between the plants.

About 10 days before being planted in the open ground, the young plants in beds or flats are blocked out with a large knife (fig. 12). Blocking, or cutting the roots, causes new roots to form quickly near the plants, making recovery from transplanting in the open easier. Blocking also makes it easier to remove the plants from the bed or flat with minimum injury.

Southern-Grown Plants

Vegetable plants grown outdoors in the South and shipped to all parts of the country are now largely replacing plants formerly grown locally in hotbeds, coldframes, and special seedbeds. They are grown cheaply and usually withstand shipment and resetting very well. They may not always be as good as home-grown plants, but they save the trouble of starting them in the house or in a hotbed. Plants of beets, brussels sprouts, cabbage, cauliflower, lettuce, onions, peppers, and tomatoes are extensively grown and shipped; tomato, cabbage, and onion plants make up the bulk of the shipments. The plants are usually wrapped in bundles of 50 each (fig. 13) and shipped by either mail or express. Tomato and pepper plants are packed with a little damp moss around the roots, but onion and cabbage plants are usually packed with bare roots. Shipments involving large numbers of bundles are packed in ventilated hampers or slatted crates and usually are sent by motor-truck or rail express. Shipments by air mail and air express are increasing.

The disadvantages of using southern-grown plants are the occasional delays in obtaining them and the possibility of transmitting such diseases as the wilt disease of the tomato, black rot of cabbage, and disorders caused by nematodes. State-

⁵ More complete information on hotbeds and coldframes is given in Farmers' Bulletin 1743, Hotbeds and Coldframes.



Figure 13.—Southern-grown tomato plants ready for packing and shipping.

certified plants that have been carefully inspected and found as free of these troubles as can be reasonably determined are available. Southern-grown plants are now offered for sale by most northern seedsmen, by mail-order houses, and often by local hardware and supply houses.

Transplanting

The term "transplanting" means shifting of a plant from one soil or culture medium to another. It may refer to the shifting of small seedlings from the seedbed to other containers where the plants will have more space for growth, or it may mean the setting of plants in the garden row where they are to develop for the crop period. Contrary to general belief, transplanting does not in itself stimulate the plant or make it grow better; actually growth is temporarily checked, but the plant is usually given more space in which to grow. Every effort should be made during transplanting to interrupt the growth of the plant as little as possible.

Plants started in seed flats, flowerpots, and other containers in the house, the hotbed, the greenhouse, or elsewhere should be shifted as soon as they can be handled to boxes, flowerpots, plant bands, or other containers where they will have

more room to develop. If shifted to flats or similar containers, the plants should be spaced 2 or more inches apart. This provides room for growth until the plants can be moved to their permanent place in the garden (fig. 14). Most gardeners prefer to place seedlings singly in flowerpots, paper cups with the bottoms pierced for drainage, plant bands, berry boxes, or other containers. When the plants are set in the garden the containers are carefully removed.

Soil for transplanting should be fertile, usually a mixture of rich topsoil and garden compost, with a very light addition of a commercial garden fertilizer. It should be treated for the control of pests. (See p. 12.)

Moistening the seedbed before removing the seedlings and care in lifting and separating the delicate plants make it possible to shift them with little damage to the root system and with only minor checks to their growth. Plants grown singly in separate containers can be moved to the garden with almost no disturbance to the root system, especially those that are hardened for a week or two before being set outdoors. Plants being hardened should be watered sparingly, but just before they are set out they should be given a thorough soaking.

Plants grown in the hotbed or greenhouse without being shifted from the seedbed to provide more room and those shipped from the South usually



Figure 14.—Thirty-two cabbage plants 3 inches apart in a 12- by 24-inch flat.

have very little soil adhering to the roots when they are set in the garden. Such plants may require special care if transplanting conditions are not ideal; otherwise, they will die or at least suffer a severe shock that will greatly retard their development. The roots of these plants should be kept covered and not allowed to dry out. Puddling the roots, that is, dipping them in a thin mixture of fresh cattle manure and clay, or even clay alone, helps greatly in bridging the critical transplanting period. Planting when the soil is moist also helps. Pouring a half pint to a pint of water, or less for small plants, into the hole around the plant before it is completely filled is usually

necessary. A starter solution made by mixing $\frac{1}{2}$ pound of a 4-12-4 or 5-10-5 commercial fertilizer in 4 gallons of water may be used instead of plain water. It is usually beneficial. Finally, the freshly set plants should be shaded for a day or two. Small branches a foot or two long from trees with heavy foliage, stuck into the soil on the south side of the plant row, serve the purpose.

Plants differ greatly in the way they recover from the loss of roots and from exposure to new conditions. Small plants of tomatoes, lettuce, beets, cabbage, and related vegetables are easy to transplant. They withstand the treatment better than peppers, eggplant, and the vine crops. When started indoors and moved to the field, the vine crops should be seeded directly in berry baskets or containers of the same size (fig. 15) that can be transferred to the garden and removed without disturbing the root systems. Beans and sweet corn can be handled in the same manner, thereby often gaining a week or two in earliness.



Figure 15.—Seeds of cucumbers, melons, beans, and sweet corn to be grown in hills may be started indoors in plant bands or berry baskets.

Care of the Garden

Cultivating

Weeds rob cultivated plants of water, nutrients, and even space and light. As soon as the soil can be properly worked after each rain or irrigation, it should be thoroughly hoed or cultivated to kill weeds that have sprouted and to leave the surface in a loose, friable condition to absorb later rainfall. The primary value of hoeing or cultivating is weed control. This cultivation should be shallow so as to avoid injuring the vegetable plant roots that lie near the surface. Although it is desirable to keep the surface soil loose, there is little to be gained by hoeing or cultivating oftener than necessary to keep weeds out of the garden.

Mulching

In nonirrigated areas that have frequent periods of insufficient soil moisture, a mulch of straw, dried lawn clippings, leaves, or similar material helps conserve moisture and hold down weeds. To be effective the mulch must be applied between the rows and around the plants early, before the soil dries out. Such a mulch is valuable, too, around unstaked tomato, cucumber, and bush squash plants to keep the fruits from contact with the soil. This keeps the fruits clean and reduces losses from certain rot organisms that are carried in the soil. The mulch should be of only medium depth after it has settled down, about 2 inches. A very deep, or thick, mulch may defeat its purpose by absorbing the water from any light rain before it reaches

the soil, thus making a water shortage more serious. In rainy areas mulching may be harmful because it helps keep the soil too wet.

Generally, any large quantity of coarse mulching material should be raked off the garden and composted, instead of being worked into the soil, just before crops are planted, because it may interfere with planting or temporarily deplete the available nitrogen supply in the soil. If such mulch material is turned under, much additional nitrogenous fertilizer must be applied to the crops immediately following.

Watering

In most areas the garden requires a moisture supply equivalent to about an inch of rain a week during the growing season for best plant growth. It requires roughly that amount of watering a week to maintain good production if the moisture stored in the soil becomes depleted and no rain falls over periods of weeks. An inch of rain is equivalent to about 28,000 gallons on an acre, or 900 gallons on a 30- by 50-foot garden.

It is much better to give the garden a good soaking about once a week than to water it sparingly more often. Light sprinklings at frequent intervals do little, if any, good. The best way to apply water, when the soil and slope are suitable, is to run it the length of furrows between the rows until the soil is well soaked. If the soil is very sandy or the surface too irregular for the furrow method, sprinklers or porous irrigating hose must be used.

Controlling Diseases and Insects

Garden crops are subject to attack by a number of diseases and insects. Preventive measures are best, but if an attack occurs and the gardener is not familiar with the insect or disease and the proper treatment to protect his crop he is advised to consult the county agent or write immediately to his experiment station. The United States Department of Agriculture and many of the States have publications containing the necessary infor-

mation on garden diseases and insects, and these can be procured free upon request. Detailed information can be found in Miscellaneous Publication 605, *A Vegetable Gardener's Handbook on Insects and Diseases*.

Among the most important disease-control measures are the use of disease-free seeds and plants, seed treatment with fungicides, and the use of disease-resistant varieties. Great progress has been made within recent years in the development of varieties that are resistant to certain diseases.

Time of Planting

One of the most important elements of success in growing vegetables is planting, or transplanting, each crop at the time or times that are best for the operation in each locality. Temperatures often differ so much between localities not many miles apart that the best planting dates for some one vegetable may differ by several days or even 2 weeks.

Vegetable crops may be roughly grouped and sown according to their hardiness and their temperature requirements. A rough timetable for planting some of the commoner crops is shown in table 3, based on the frost-free dates in spring and fall. The frost-free date in spring is usually 2 to 3 weeks later than the average date of the last freeze in a locality and is approximately the date that oak trees leaf out.

The gardener naturally wants to make the first planting of each vegetable as early as he can without too much danger of its being damaged by cold. Many vegetables are so hardy to cold that they can be planted a month or more before the average date of the last freeze, or about 6 weeks before the frost-free date. Furthermore, most, if not all, cold-tolerant crops actually thrive better in cool weather than in hot weather and should

not be planted late in the spring in the southern two-thirds of the country where summers are hot. Thus, the gardener must time his planting not only to escape cold but with certain crops also to escape heat. Some vegetables that will not thrive when planted in late spring in areas having rather hot summers may be sown in late summer, however, so that they will make most of their growth in cooler weather.

A gardener anywhere in the United States can determine his own safe planting dates for different crops by using the maps (figs. 16 to 19), together with tables 4 and 5, in this bulletin. The maps, drawn from United States Weather Bureau originals, show the average dates of the last killing frosts in spring and the average dates of the first killing frosts in fall. They are the dates from which planting times can be determined, and such determinations have been so worked out in tables 4 and 5 that any gardener can use them, with only a little trouble, to find out the planting dates for his locality.

Table 4, for use with the maps in figures 16 and 17, shows planting dates between January 1 and June 30, covering chiefly spring and early-summer crops. It shows *how early it is safe to plant*; it also shows the spring and early-summer dates *beyond which planting usually gives poor results*.

Opposite each vegetable in table 4, the first date in any column is the *earliest generally safe* date that the crop can be sown or transplanted by the gardener using that column. (No gardener needs to use more than one of the columns.) The second date is the latest date that is likely to prove satisfactory for the planting. All times in between these two dates may not, however, give equally good results. Most of the crops listed do better when planted not too far from the earlier date shown.

TABLE 3.—Some common vegetables grouped according to the approximate times they can be planted and their relative requirements for cool and warm weather

| Cold-hardy plants for early-spring planting | | Cold-tender or heat-hardy plants for late-spring or early-summer planting | | | Hardy plants for late-summer or fall planting except in the North (plant 6 to 8 weeks before first fall freeze) |
|---|--|--|---|--|---|
| Very hardy (plant 4 to 6 weeks before frost-free date) | Hardy (plant 2 to 4 weeks before frost-free date) | Not cold-hardy (plant on frost-free date) | Requiring hot weather (plant 1 week or more after frost-free date) | Medium heat-tolerant (good for summer planting) | |
| Broccoli Cabbage Lettuce Onions Peas Potato Spinach Turnip | Beets Carrot Chard Mustard Parsnip Radish | Beans, snap Okra New Zealand spinach Soybean Squash Sweet corn Tomato | Beans, lima Eggplant Peppers Sweetpotato Cucumber Melons | Beans, all Chard Soybean New Zealand spinach Squash Sweet corn | Beets Collard Kale Lettuce Mustard Spinach Turnip |

How to Determine Planting Dates

To determine the best time to plant any vegetable in the spring in your locality:

1. Find your location on the map in figure 16 or 17; then, the solid line on the map that comes nearest to it.

2. Find the date shown on the solid line. This is the average date of the last killing frost. The first number represents the month; the second number, the day. Thus, 3-10 is March 10. Once you know the date you are through with the map.

3. Turn to table 4; find the column that has your date over it; and draw a heavy line around this entire column. It is the only date column in the table that you will need.

4. Find the dates in the column that are on a line with the name of the crop you want to plant. These dates show the period during which the crop can safely be planted. The best time is on, or soon after, the first of the two dates. A time halfway between them is very good; the second date is not so good.

For areas in the Plains region that warm up quickly in the spring and are subject to dry weather, very early planting is essential to escape heat and drought. In fact, most of the cool-season crops do not thrive when spring-planted in the southern part of the Great Plains and southern Texas.

Table 5 is used with the maps in figures 18 and 19 in the same way to find the dates for late plantings. The recommendations for late plantings and for those in the South for overwintered crops are less exact and less dependable than those for early planting. Factors other than direct temperature effects—summer rainfall, for example, and the severity of diseases and insects—often make success difficult, especially in the Southeast, although some other areas having the same frost dates are more favorable. A date about halfway between the two shown in table 5 will generally be best, although in most areas fair success can be expected within the entire range of dates shown.

Along the northern half of the Pacific coast, warm-weather crops should not be planted quite so late as the frost date and table would indicate. Although frost comes late, very cool weather prevails for some time before frost, retarding late growth of crops like sweet corn, lima beans, and tomatoes.

Culture of Specific Crops

Perennial Vegetables

Farm and country vegetable gardens need a number of perennials. Asparagus, horseradish, and rhubarb are the most important, but chives (p. 41), bottom multiplier onions (p. 43), and some of the flavoring and condiment plants, chiefly sage and mint, are also desirable. Unfortunately, asparagus, horseradish, and rhubarb are not adapted to conditions in the lower South.

All the perennial crops should be grouped together along one side of the garden, where they will not interfere with work on the annual crops.

Asparagus

Asparagus is among the earliest of spring vegetables. An area about 20 feet square, or a row 50 to 75 feet long, will supply plenty of fresh asparagus for a family of five or six persons, provided the soil is well enriched and the plants are given good attention. More must be planted if a supply is to be canned or frozen.

Asparagus does best where winters are cold enough to freeze the ground to a depth of a few inches at least. In many southern areas the plants make a weak growth, producing small shoots. Elevation has some effect, but, in general, the latitude of south-central Georgia is the southern limit of profitable culture.

The crop can be grown on almost any well-drained, fertile soil, and there is little possibility of having the soil too rich, especially through the use of manure.

Loosen the soil far down, either by subsoil plowing or by deep spading before planting. Throw the topsoil aside and spade manure, leafmold,

rotted leaves, or peat into the subsoil to a depth of 14 to 16 inches; then mix from 5 to 10 pounds of a complete fertilizer into each 75-foot row or 20-foot bed.

When the soil is ready for planting, the bottom of the trench should be about 6 inches below the natural level of the soil (fig. 20). After the crowns are set and covered to a depth of an inch or two, gradually work the soil into the trench around the plants during the first season. When set in beds, asparagus plants should be at least 1½ feet apart each way; when set in rows, they should be about 1½ feet apart, with the rows from 4 to 5 feet apart.

Asparagus plants, or crowns, are grown from seed. The use of 1-year-old plants only is recommended. These should have a root spread of at least 15 inches, and larger ones are better. The home gardener will usually find it best to buy his plants from a grower who has a good strain of a recognized variety. Mary Washington and Paradise are good varieties that have the added merit of being rust-resistant. California 500 is an improved strain of Mary Washington. It contains very little of the purple overcast predominant in the Mary Washington and it has a good green color clear into the ground line. In procuring asparagus crowns it is always well to be sure that they have not been allowed to dry out.

Clean cultivation encourages vigorous growth; it behooves the gardener to keep his asparagus clean from the start. In a large farm garden, with long rows, most of the work can be done with a horse-drawn cultivator or a garden tractor. In a small garden, where the rows are short or the



Figure 16.—Average dates of the last killing spring frosts in western United States, 1899 to 1938. Locate the line nearest to the locality in which you live, note the date on that line (the first figure indicates the month, the second the day; thus 3-20 is March 20), and then refer to table 4. Detailed instructions are on page 19. This map and table 4 are most useful in the absence of local information. (Redrawn from U. S. Weather Bureau original.)

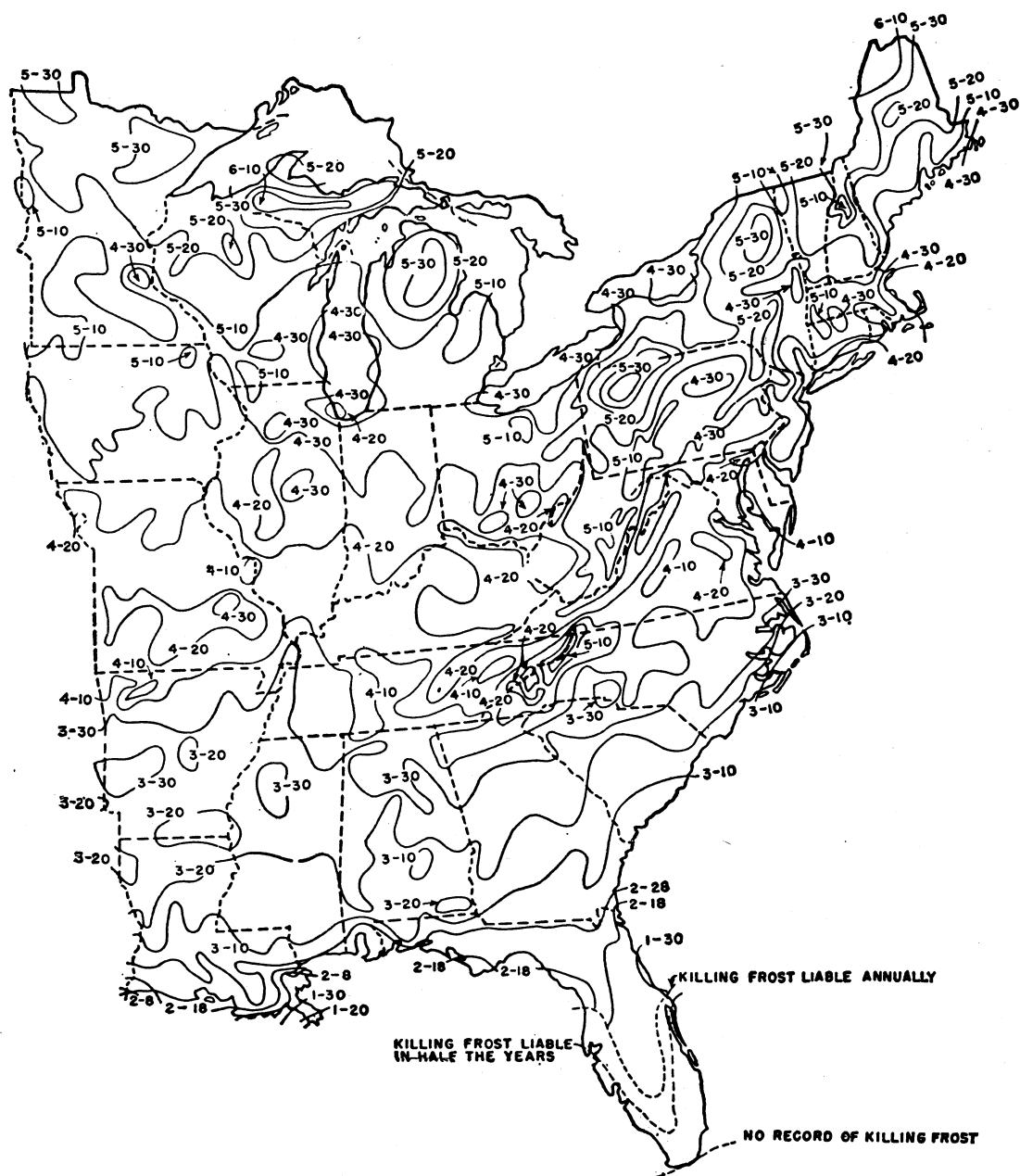


Figure 17.—Average dates of the last killing spring frosts in eastern United States, 1899 to 1938. Locate the line nearest to the locality in which you live, note the date on that line (the first figure indicates the month, the second the day; thus 3-10 is March 10), and then refer to table 4. Detailed instructions are on page 19. This map and table 4 are most useful in the absence of local information. (Redrawn from U. S. Weather Bureau original.)



Figure 18.—Average dates of the first killing fall frosts in western United States, 1899 to 1938. Locate the line nearest to the locality in which you live, note the date on that line (the first figure indicates the month, the second the day; thus 11-30 is November 30), and then refer to table 5. Detailed instructions are on page 19. This map and table 5 are most useful in the absence of local information. (Redrawn from U. S. Weather Bureau original.)

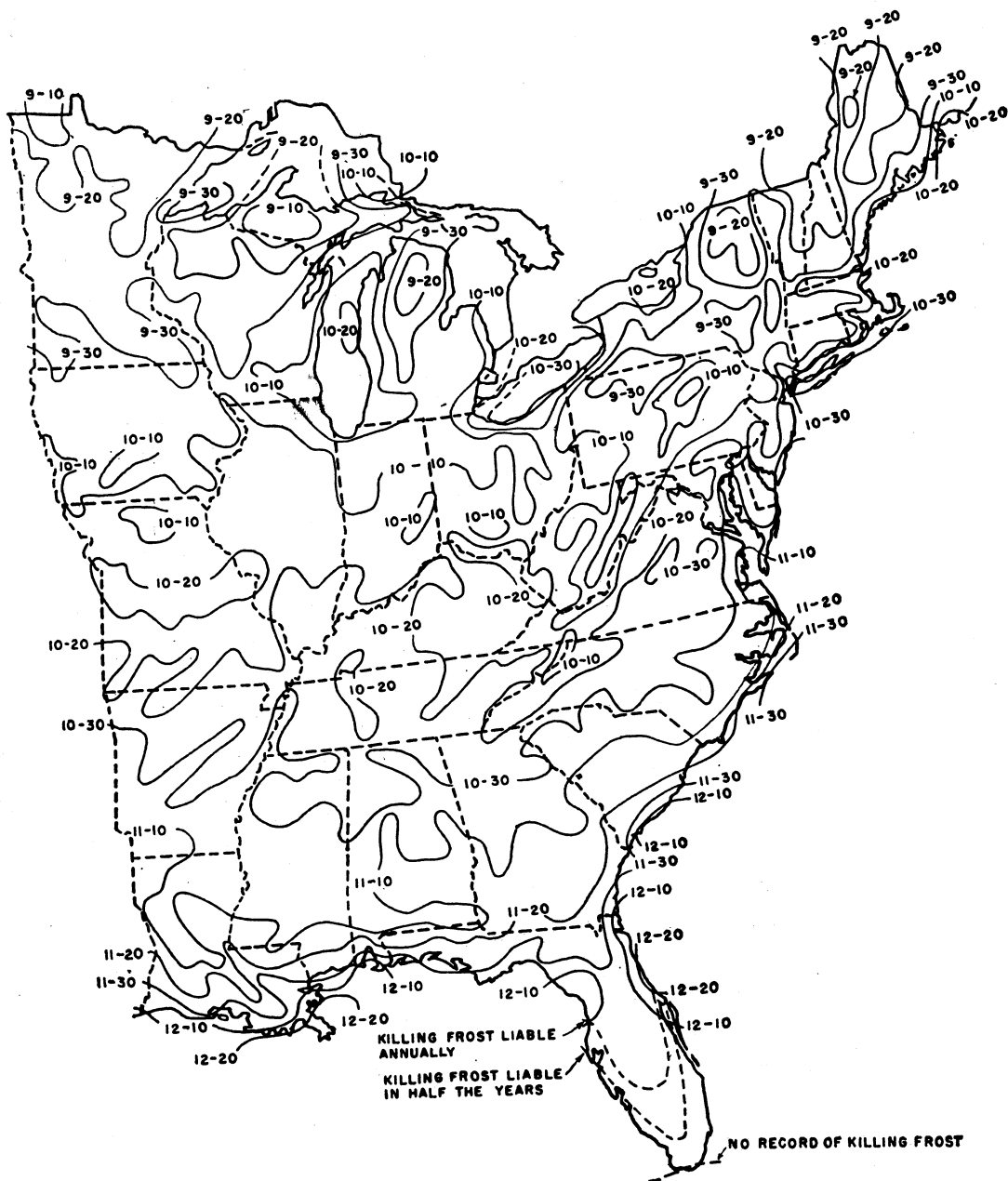


Figure 19.—Average dates of the first killing fall frosts in eastern United States, 1899 to 1938. Locate the line nearest to the locality in which you live, note the date on that line (the first figure indicates the month, the second the day; thus 11-10 is November 10), and then refer to table 5. Detailed instructions are on page 19. This map and table 5 are most useful in the absence of local information. (Redrawn from U. S. Weather Bureau original.)

TABLE 4.—*Earliest dates, and range of dates, for safe spring planting of vegetables in the open*

[Average dates of last spring frost shown in figures 16 and 17]

| Crop | Planting dates for localities in which average date of last freeze is— | | | | | | |
|-----------------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | Jan. 30 | Feb. 8 | Feb. 18 | Feb. 28 | Mar. 10 | Mar. 20 | Mar. 30 |
| Asparagus 1 | Feb. 1–Apr. 15 | Feb. 10–May 1 | Mar. 1–May 1 | Mar. 15–June 1 | Jan. 1–Mar. 1 | Feb. 1–Mar. 10 | Feb. 15–Mar. 20 |
| Beans, lima | Feb. 1–Apr. 1 | Feb. 1–May 1 | do | Mar. 10–May 15 | Mar. 20–June 1 | Apr. 1–June 15 | Apr. 15–June 20 |
| Beans, snap | Jan. 1–Mar. 15 | Jan. 10–Mar. 15 | Jan. 20–Apr. 1 | Feb. 1–Apr. 15 | Mar. 15–May 15 | Mar. 15–May 25 | Apr. 1–June 1 |
| Beet | Jan. 1–30 | Jan. 1–30 | Jan. 15–Feb. 15 | Feb. 1–Mar. 1 | Feb. 15–June 1 | Feb. 15–May 15 | Mar. 1–June 1 |
| Broccoli, sprouting 1 | do | do | do | do | Feb. 15–Mar. 15 | Feb. 15–Mar. 15 | Mar. 1–20 |
| Brussels sprouts 1 | Jan. 1–15 | Jan. 1–Feb. 10 | Jan. 1–Feb. 25 | Jan. 15–Feb. 25 | do | do | Do |
| Cabbage 1 | (2) | (2) | (2) | (2) | Jan. 25–Mar. 1 | Feb. 1–Mar. 1 | Feb. 15–Mar. 10 |
| Cabbage, Chinese | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 15–Mar. 1 | Feb. 1–Mar. 1 | Feb. 10–Mar. 15 | Feb. 15–Mar. 20 | Mar. 1–Apr. 10 |
| Carrot | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 10–Feb. 10 | Jan. 20–Feb. 20 | Feb. 1–Mar. 1 | Feb. 10–Mar. 10 | Feb. 20–Mar. 20 |
| Cauliflower 1 | do | do | Jan. 20–Feb. 20 | Feb. 1–Mar. 1 | Feb. 20–Mar. 20 | Mar. 1–Apr. 1 | Mar. 15–Apr. 15 |
| Celery and celeriac | Jan. 1–Apr. 1 | Jan. 10–Apr. 1 | Jan. 20–Apr. 15 | Feb. 1–May 1 | Feb. 15–May 15 | Feb. 20–May 15 | Mar. 1–May 25 |
| Chard | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 15–Feb. 15 | Feb. 1–Mar. 1 | Feb. 10–Mar. 10 | Feb. 15–Mar. 15 |
| Chervil and chives | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 1–Mar. 15 | Jan. 15–Mar. 15 | June 1–July 1 | June 1–July 1 | June 1–July 1 |
| Chicory, witloof | do | do | do | Jan. 1–Mar. 1 | Jan. 1–Mar. 15 | Jan. 1–Mar. 15 | Jan. 1–Mar. 15 |
| Collards 1 | Feb. 1–Mar. 15 | Feb. 10–Apr. 1 | Feb. 20–Apr. 15 | Mar. 1–Apr. 15 | Mar. 10–Apr. 15 | Mar. 15–May 1 | Mar. 25–May 15 |
| Corn salad | Jan. 1–Feb. 1 | Jan. 1–Feb. 15 | Jan. 15–Feb. 15 | Feb. 1–Mar. 1 | Feb. 10–Mar. 15 | Feb. 20–Mar. 15 | Mar. 1–Apr. 1 |
| Corn, sweet | Feb. 15–Mar. 15 | Feb. 15–Apr. 1 | Feb. 15–Apr. 15 | Mar. 1–Apr. 15 | Mar. 15–Apr. 15 | Apr. 1–May 1 | Apr. 10–May 15 |
| Cress, upland | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 |
| Cucumber | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 | Jan. 1–Feb. 1 |
| Dandelion | Feb. 1–Mar. 1 | Feb. 10–Mar. 15 | Feb. 20–Apr. 1 | Mar. 10–Apr. 15 | Mar. 15–Apr. 15 | Apr. 1–May 1 | Apr. 10–May 15 |
| Eggplant 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 |
| Endive | do | do | do | do | do | do | do |
| Fennel, Florence | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Garlic | Jan. 1–Feb. 1 | Jan. 10–Feb. 1 | Jan. 20–Feb. 10 | Feb. 1–20 | Feb. 10–Mar. 1 | Feb. 20–Mar. 10 | Mar. 1–Apr. 1 |
| Horseradish 1 | do | do | do | do | do | do | do |
| Kale | do | do | do | do | do | do | do |
| Kohlrabi | do | do | do | do | do | do | do |
| Leek | do | do | do | do | do | do | do |
| Lettuce, head 1 | do | do | do | do | do | do | do |
| Lettuce, leaf | do | do | do | do | do | do | do |
| Muskmelon | Feb. 15–Mar. 15 | Feb. 15–Apr. 1 | Feb. 15–Apr. 15 | Mar. 1–Apr. 15 | Mar. 15–Apr. 15 | Apr. 1–May 1 | Apr. 10–May 15 |
| Mustard | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 |
| Okra | Feb. 15–Apr. 1 | Feb. 15–Apr. 15 | Mar. 1–June 1 | Mar. 10–June 1 | Mar. 20–June 1 | Apr. 1–June 15 | Apr. 10–June 15 |
| Onion 1 | Jan. 1–15 | Jan. 1–15 | Jan. 1–15 | Jan. 1–15 | Jan. 1–15 | Jan. 1–15 | Jan. 1–15 |
| Onion, seed | do | do | do | do | do | do | do |
| Onion, sets | do | do | do | do | do | do | do |
| Parsley | Jan. 1–30 | Jan. 1–30 | Jan. 1–30 | Jan. 1–30 | Jan. 1–30 | Jan. 1–30 | Jan. 1–30 |
| Parsnip | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 |
| Peas, garden | Feb. 15–May 1 | Feb. 15–May 15 | Mar. 1–June 15 | Mar. 10–June 20 | Mar. 15–July 1 | Apr. 1–July 1 | Apr. 15–July 1 |
| Peas, black-eye | Feb. 1–Apr. 1 | Feb. 15–Apr. 15 | Mar. 1–May 1 | Mar. 15–May 1 | Apr. 1–June 1 | Apr. 10–June 1 | Apr. 15–June 1 |
| Pepper 1 | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 15–Mar. 1 | Jan. 15–Mar. 1 | Jan. 15–Mar. 1 | Jan. 15–Mar. 1 | Jan. 15–Mar. 1 |
| Potato | Jan. 1–Apr. 1 | Jan. 1–Apr. 1 | Jan. 1–Apr. 1 | Jan. 1–Apr. 1 | Jan. 1–Apr. 15 | Jan. 20–May 1 | Feb. 15–May 1 |
| Radish | do | do | do | do | do | do | do |
| Rhubarb 1 | Jan. 1–Feb. 1 | Jan. 10–Feb. 10 | Jan. 15–Feb. 20 | Jan. 15–Mar. 1 | Jan. 15–Mar. 1 | Jan. 15–Mar. 1 | Jan. 15–Mar. 1 |
| Rutabaga | do | do | do | do | do | do | do |
| Salsify | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 |
| Shallot | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 |
| Sorrel | Mar. 1–June 30 | Mar. 1–June 30 | Mar. 1–June 30 | Mar. 1–June 30 | Mar. 1–June 30 | Mar. 1–June 30 | Mar. 1–June 30 |
| Soybean | Jan. 1–Feb. 15 | Jan. 1–Feb. 15 | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 15–Mar. 10 | Jan. 15–Mar. 15 | Feb. 1–Mar. 20 |
| Spinach | Feb. 1–Apr. 15 | Feb. 15–Apr. 15 | Mar. 1–Apr. 15 | Mar. 15–May 15 | Mar. 20–May 15 | Apr. 1–May 15 | Apr. 10–June 1 |
| Spinach, New Zealand | do | do | do | do | do | do | do |
| Squash, summer | Feb. 15–May 15 | Mar. 1–May 15 | Mar. 20–June 1 | Mar. 20–June 1 | Apr. 1–June 1 | Apr. 10–June 1 | Apr. 20–June 1 |
| Sweetpotato | Feb. 1–Apr. 1 | Feb. 20–Apr. 10 | Mar. 1–Apr. 20 | Mar. 10–May 1 | Mar. 20–May 10 | Apr. 1–May 20 | Apr. 10–June 1 |
| Turnip | Jan. 1–Mar. 1 | Jan. 1–Mar. 1 | Jan. 10–Mar. 1 | Jan. 20–Mar. 1 | Feb. 1–Mar. 1 | Feb. 10–Mar. 10 | Feb. 20–Mar. 20 |
| Watermelon | Feb. 15–Mar. 15 | Feb. 15–Apr. 1 | Feb. 15–Apr. 15 | Mar. 1–Apr. 15 | Mar. 15–Apr. 15 | Apr. 1–May 1 | Apr. 10–May 15 |

1 Plants.

2 Generally fall-planted (table 5).

Figure 20.—*Asparagus crowns or plants set in a trench ready for covering.*

asparagus is planted in beds, however, hand work is necessary.

For a 75-foot row, an application of manure and 6 to 8 pounds of a high-grade complete fertilizer, once each year, is recommended. Manure and fertilizer may be applied either before or after the cutting season.

Remove no shoots the year the plants are set in the permanent bed and keep the cutting period short the year after setting. Remove all shoots during the cutting season in subsequent years (fig. 21). Cease cutting about July 1 to 10 and let the tops grow. In the autumn, remove and burn the dead tops.

Asparagus rust and asparagus beetles are the chief enemies of the crop.

TABLE 4.—*Earliest dates, and range of dates, for safe spring planting of vegetables in the open—Continued*

[Average dates of last spring frost shown in figures 16 and 17]

| Crop | Planting dates for localities in which average date of last freeze is— | | | | | | |
|----------------------------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|
| | Apr. 10 | Apr. 20 | Apr. 30 | May 10 | May 20 | May 30 | June 10 |
| Asparagus ¹ | Mar. 10-Apr. 10 | Mar. 15-Apr. 15 | Mar. 20-Apr. 15 | Apr. 10-Apr. 30 | Apr. 20-May 15 | May 1-June 1 | May 15-June 1 |
| Beans, lima | Apr. 1-June 30 | May 1-June 20 | May 15-June 15 | May 25-June 15 | May 1-June 1 | May 1-June 1 | May 15-June 15 |
| Beans, snap | Apr. 10-June 30 | Apr. 25-June 30 | May 10-June 30 | May 10-June 30 | May 15-June 30 | May 25-June 15 | May 15-June 15 |
| Beet | Mar. 10-June 1 | Mar. 20-June 1 | Apr. 1-June 15 | Apr. 15-June 15 | Apr. 25-June 15 | May 1-June 15 | May 15-June 15 |
| Broccoli, sprouting ¹ | Mar. 15-Apr. 15 | Mar. 25-Apr. 20 | Apr. 1-May 1 | Apr. 15-June 1 | May 1-June 15 | May 10-June 10 | May 20-June 10 |
| Brussels sprouts ¹ | do | do | do | do | do | do | Do. |
| Cabbage ¹ | Mar. 1-Apr. 1 | Mar. 10-Apr. 1 | Mar. 15-Apr. 10 | Apr. 1-May 15 | do | May 10-June 15 | May 20-June 1 |
| Cabbage, Chinese | (2) | (2) | (2) | do | do | do | Do. |
| Carrot | Mar. 10-Apr. 20 | Apr. 1-May 15 | Apr. 10-June 1 | Apr. 20-June 15 | May 1-June 1 | May 10-June 1 | Do. |
| Cauliflower ¹ | Mar. 1-Mar. 20 | Mar. 15-Apr. 20 | Apr. 10-May 10 | Apr. 15-May 15 | May 10-June 15 | May 20-June 1 | June 1-June 15 |
| Celery and celeriac | Apr. 1-Apr. 20 | Apr. 10-May 1 | Apr. 15-May 1 | Apr. 20-June 15 | do | do | Do. |
| Chard | Mar. 15-June 15 | Apr. 1-June 15 | Apr. 15-June 15 | do | do | do | Do. |
| Chervil and chives | Mar. 1-Apr. 1 | Mar. 10-Apr. 10 | Mar. 20-Apr. 20 | Apr. 1-May 1 | Apr. 15-May 15 | May 1-June 1 | May 15-June 1 |
| Chicory, witloof | June 10-June 1 | June 15-July 1 | June 15-July 1 | June 1-20 | June 1-15 | June 1-15 | June 1-15 |
| Collards ¹ | Mar. 1-June 1 | Mar. 10-June 1 | Apr. 1-June 1 | Apr. 15-June 1 | May 1-June 1 | May 10-June 1 | May 20-June 1 |
| Corn salad | Mar. 1-June 1 | Feb. 15-Apr. 15 | Mar. 1-May 1 | Apr. 1-June 1 | Apr. 15-June 1 | May 1-June 15 | May 15-June 15 |
| Corn, sweet | Apr. 10-June 1 | Apr. 25-June 15 | May 10-June 15 | May 10-June 1 | May 15-June 1 | May 20-June 1 | May 15-June 15 |
| Cress, upland | Mar. 10-Apr. 15 | Mar. 20-May 1 | Apr. 10-May 10 | Apr. 20-May 20 | May 1-June 1 | May 15-June 1 | May 15-June 15 |
| Cucumber | Apr. 20-June 1 | May 1-June 15 | May 15-June 15 | May 20-June 15 | June 1-15 | June 1-15 | Do. |
| Dandelion | Mar. 1-Apr. 1 | Mar. 10-Apr. 10 | Mar. 20-Apr. 20 | Apr. 1-May 1 | Apr. 15-May 15 | May 1-30 | May 1-30 |
| Eggplant ¹ | May 1-June 1 | May 10-June 1 | May 15-June 10 | May 20-June 15 | June 1-15 | June 1-15 | Do. |
| Endive | Mar. 15-Apr. 15 | Mar. 25-Apr. 15 | Apr. 1-May 1 | Apr. 15-May 15 | May 1-30 | May 1-30 | May 15-June 1 |
| Fennel, Florence | do | do | do | do | do | do | Do. |
| Garlic | Feb. 20-Mar. 20 | Mar. 10-Apr. 1 | Mar. 15-Apr. 15 | Apr. 1-May 1 | Apr. 15-May 15 | do | Do. |
| Horseradish ¹ | Mar. 10-Apr. 10 | Mar. 20-Apr. 20 | Apr. 1-30 | Apr. 15-May 15 | Apr. 20-May 20 | do | Do. |
| Kale | Mar. 10-Apr. 1 | Mar. 20-Apr. 10 | Apr. 1-20 | Apr. 10-May 1 | Apr. 20-May 10 | do | Do. |
| Kohlrabi | Mar. 10-Apr. 10 | Mar. 20-May 1 | Apr. 1-May 10 | Apr. 10-May 15 | Apr. 20-May 20 | do | Do. |
| Leek | Mar. 1-Apr. 1 | Mar. 15-Apr. 15 | Apr. 1-May 1 | Apr. 15-May 15 | May 1-May 20 | May 1-15 | May 1-15 |
| Lettuce, head ¹ | Mar. 10-Apr. 1 | Mar. 20-Apr. 15 | do | do | May 1-June 30 | May 10-June 30 | May 20-June 30 |
| Lettuce, leaf | Mar. 15-May 15 | Mar. 20-May 15 | Apr. 1-June 1 | Apr. 15-June 15 | do | do | Do. |
| Muskmelon | Apr. 20-June 1 | May 1-June 15 | May 15-June 15 | June 1-June 15 | do | do | Do. |
| Mustard | Mar. 10-Apr. 20 | Mar. 20-May 1 | Apr. 1-May 10 | Apr. 15-June 1 | May 1-June 30 | May 10-June 30 | Do. |
| Okra | Apr. 20-June 15 | May 1-June 1 | May 10-June 1 | May 20-June 10 | June 1-20 | June 1-20 | Do. |
| Onion ¹ | Mar. 1-Apr. 1 | Mar. 15-Apr. 10 | Apr. 1-May 1 | Apr. 10-May 1 | Apr. 20-May 15 | May 1-30 | May 10-June 10 |
| Onion, seed | do | Mar. 15-Apr. 1 | Mar. 15-Apr. 15 | Apr. 1-May 1 | do | do | Do. |
| Onion, sets | do | Mar. 10-Apr. 1 | Mar. 10-Apr. 10 | Apr. 10-May 1 | do | do | Do. |
| Parsley | Mar. 10-Apr. 10 | Mar. 20-Apr. 20 | Apr. 1-May 1 | Apr. 15-May 15 | May 1-20 | May 10-June 1 | May 20-June 10 |
| Parsnip | do | do | do | do | do | do | Do. |
| Peas, garden | Feb. 20-Mar. 20 | Mar. 10-Apr. 10 | Mar. 20-May 1 | Apr. 1-May 15 | Apr. 15-June 1 | May 1-June 15 | May 10-June 15 |
| Peas, black-eye | May 1-July 1 | May 10-June 15 | May 15-June 1 | do | do | do | Do. |
| Pepper ¹ | May 1-June 1 | May 10-June 15 | May 15-June 10 | May 20-June 10 | May 25-June 15 | June 1-15 | Do. |
| Potato | Mar. 10-Apr. 1 | Mar. 15-Apr. 10 | Mar. 20-May 10 | Apr. 1-June 1 | Apr. 15-June 15 | May 1-June 15 | May 15-June 1 |
| Radish | Mar. 1-May 1 | Mar. 10-May 10 | do | do | do | do | Do. |
| Rhubarb ¹ | Mar. 1-Apr. 1 | Mar. 10-Apr. 10 | Mar. 20-Apr. 15 | Apr. 1-May 1 | Apr. 15-May 10 | May 1-20 | Do. |
| Rutabaga | do | do | May 1-June 1 | May 1-June 1 | May 1-20 | May 10-20 | May 20-June 1 |
| Salsify | Mar. 10-Apr. 15 | Mar. 20-May 1 | Apr. 1-May 15 | Apr. 15-June 1 | May 1-June 1 | May 10-June 1 | Do. |
| Shallot | Mar. 1-Apr. 1 | Mar. 15-Apr. 15 | Apr. 1-May 1 | Apr. 10-May 1 | Apr. 20-May 10 | May 1-June 1 | May 10-June 1 |
| Sorrel | Mar. 1-Apr. 15 | Mar. 15-May 1 | Apr. 1-May 15 | Apr. 15-June 1 | May 1-June 1 | May 10-June 10 | May 20-June 10 |
| Soybean | May 1-June 30 | May 10-June 20 | May 15-June 15 | May 25-June 10 | do | do | Do. |
| Spinach | Feb. 15-Apr. 1 | Mar. 1-Apr. 15 | Mar. 20-Apr. 20 | Apr. 1-June 15 | Apr. 10-June 15 | Apr. 20-June 15 | May 1-June 15 |
| Spinach, New Zealand | Apr. 20-June 1 | May 1-June 15 | May 1-June 15 | May 10-June 15 | May 20-June 15 | June 1-15 | June 1-15 |
| Squash, summer | do | do | May 1-30 | May 10-June 10 | do | June 1-20 | June 10-20 |
| Sweetpotato | May 1-June 1 | May 10-June 10 | May 20-June 10 | May 15-June 10 | May 25-June 15 | June 5-20 | June 15-30 |
| Tomato | Apr. 20-June 1 | May 5-June 10 | May 10-June 15 | Apr. 1-June 1 | Apr. 15-June 1 | May 1-June 15 | May 15-June 15 |
| Turnip | Mar. 1-Apr. 1 | Mar. 10-Apr. 1 | Mar. 20-May 1 | Apr. 1-June 1 | Apr. 15-June 1 | May 1-June 15 | May 15-June 15 |
| Watermelon | Apr. 20-June 1 | May 1-June 15 | May 15-June 15 | June 1-June 15 | June 15-July 1 | do | do |

¹ Plants.² Generally fall-planted (table 5).

Horseradish

Horseradish is adapted to the north-temperate regions of the United States, but not to the South, except possibly in the high altitudes.

Any good soil, except possibly the lightest sands and heaviest clays, will grow horseradish, but it does best on a deep, rich, moist loam that is well supplied with organic matter. Avoid shallow soil; it produces rough, prongy roots. Mix manure with the soil a few months before the plants or cuttings are set. Some fertilizer may be used at the time of planting and more during the subsequent seasons. A top dressing of manure each spring is advisable, but a good, deep soil in an old garden will usually grow good horseradish without heavy manuring or fertilizing.

Horseradish is propagated either by crowns or by root cuttings. In propagating by crowns a portion of an old plant consisting of a piece of root and crown buds is merely lifted and planted



Figure 21.—*Asparagus shoots ready to be cut—a few inches long and not yet tough.*

TABLE 5.—*Latest dates, and range of dates, for safe fall planting of vegetables in the open*

[Average dates of first fall frost shown in figures 18 and 19]

| Crop | Planting dates for localities in which average dates of first freeze is— | | | | | |
|----------------------------------|--|------------------|-----------------|-----------------|------------------|-------------------|
| | Aug. 30 | Sept. 10 | Sept. 20 | Sept. 30 | Oct. 10 | Oct. 20 |
| Asparagus ¹ | | | | | Oct. 20–Nov. 15 | Nov. 1–Dec. 15. |
| Beans, lima | | | | June 1–15 | June 1–15 | June 15–30. |
| Bean, snap | | May 15–June 15 | June 1–July 1 | June 1–July 10 | June 15–July 20 | July 1–Aug. 1. |
| Beet | May 15–June 15 | do. | do. | do. | June 15–July 20 | July 1–Aug. 5. |
| Broccoli, sprouting | May 1–June 1 | May 1–June 1 | May 1–June 15 | June 1–30 | June 15–July 15 | July 1–Aug. 1. |
| Brussels sprouts | do. | do. | do. | do. | do. | Do. |
| Cabbage ¹ | | | | | | July 1–20. |
| Cabbage, Chinese | May 15–June 15 | May 15–June 15 | June 1–July 1 | June 1–July 10 | June 1–July 15 | July 15–Aug. 15. |
| Carrot | do. | do. | do. | June 1–July 15 | June 15–Aug. 1 | June 15–Aug. 1. |
| Cauliflower ¹ | May 1–June 1 | May 1–July 1 | May 1–July 1 | June 1–July 10 | June 1–July 15 | July 1–20. |
| Celery ¹ and celeriac | do. | May 15–June 15 | May 15–July 1 | June 1–July 15 | June 15–Aug. 1 | July 15–Aug. 15. |
| Chard | May 15–June 15 | May 15–July 1 | June 1–July 1 | May 10–July 15 | June 1–July 25 | July 1–Aug. 5. |
| Chervil and chives | May 10–June 10 | May 1–June 15 | May 15–July 1 | June 1–July 5 | June 1–July 15 | June 1–Aug. 1. |
| Chicory, witloof | May 15–June 15 | May 15–June 15 | May 15–June 15 | do. | June 1–July 20 | Do. |
| Collards ¹ | do. | do. | do. | (2) | (2) | (2) |
| Cornsalad | do. | May 15–July 1 | June 15–Aug. 1 | June 1–July 1 | June 1–July 1 | June 15–July 15. |
| Corn, sweet | | | | June 15–July 15 | July 1–Aug. 1 | July 15–Aug. 15. |
| Cress, upland | May 15–June 15 | May 15–July 1 | June 1–July 1 | July 15–Sept. 1 | Aug. 15–Sept. 15 | Sept. 1–Oct. 15. |
| Cucumber | | | June 1–15 | June 1–July 1 | June 1–July 10 | June 1–July 20. |
| Dandelion | June 1–15 | June 1–July 1 | June 1–July 1 | July 15–Sept. 1 | Aug. 15–Sept. 15 | Sept. 1–Oct. 15. |
| Eggplant ¹ | | | | June 1–July 1 | June 1–July 1 | June 1–July 15. |
| Endive | June 1–July 1 | June 1–July 1 | June 15–July 15 | June 1–Aug. 1 | July 15–Sept. 1 | Aug. 1–Sept. 15. |
| Fennel, Florence | May 15–June 15 | May 15–July 15 | June 1–July 1 | May 20–June 10 | May 15–June 15 | June 1–July 1. |
| Garlic | (2) | (2) | (2) | June 15–Aug. 1 | July 1–Aug. 15 | July 15–Sept. 1. |
| Horseradish ¹ | (2) | (2) | (2) | June 1–July 1 | June 15–July 15 | June 15–Aug. 1. |
| Kale | May 15–June 15 | May 15–June 15 | June 1–July 1 | (2) | (2) | (2) |
| Kohlrabi | do. | June 1–July 1 | June 1–July 15 | June 15–July 15 | July 1–Aug. 1 | July 15–Aug. 15. |
| Leek | May 1–June 1 | May 1–June 1 | (2) | do. | do. | Do. |
| Lettuce, head ¹ | May 15–July 1 | May 15–July 1 | June 1–July 15 | (2) | (2) | (2) |
| Lettuce, leaf | May 15–July 15 | May 15–July 15 | June 1–Aug. 1 | June 15–Aug. 1 | July 15–Aug. 15 | Aug. 1–30. |
| Muskmelon | | | June 1–Aug. 1 | June 1–Aug. 1 | July 15–Sept. 1 | July 15–Sept. 1. |
| Mustard | May 15–July 15 | May 15–July 15 | June 1–Aug. 1 | May 15–June 1 | June 1–July 1 | June 15–July 20. |
| Okra | | | June 1–20 | June 15–Aug. 1 | July 15–Aug. 15 | Aug. 1–Sept. 1. |
| Onion ¹ | May 1–June 10 | May 1–June 10 | June 1–July 1 | June 1–July 1 | June 1–July 15 | June 1–Aug. 1. |
| Onion, seed | do. | do. | (2) | (2) | (2) | (2) |
| Onion, sets | do. | do. | (2) | (2) | (2) | (2) |
| Parsley | May 15–June 15 | May 1–June 15 | June 1–July 1 | June 1–July 15 | June 15–Aug. 1 | July 15–Aug. 15. |
| Parsnip | May 15–June 1 | do. | May 15–June 15 | June 1–July 1 | June 1–July 10 | (2) |
| Peas, garden | May 10–June 15 | May 1–July 1 | June 1–July 15 | June 1–Aug. 1 | (2) | (2) |
| Peas, black-eye | | | | | June 1–July 1 | June 1–July 1. |
| Pepper ¹ | | | June 1–June 20 | June 1–July 1 | do. | June 1–July 10. |
| Potato | May 15–June 1 | May 1–June 15 | May 1–June 15 | May 1–June 15 | May 15–June 15 | June 15–July 15. |
| Radish | May 1–July 15 | May 1–Aug. 1 | June 1–Aug. 15 | July 1–Sept. 1 | July 15–Sept. 15 | Aug. 1–Oct. 1. |
| Rhubarb ¹ | Sept. 1–Oct. 1 | Sept. 15–Oct. 15 | Sept. 15–Nov. 1 | Oct. 1–Nov. 1 | Oct. 15–Nov. 15 | Oct. 15–Dec. 1. |
| Rutabaga | May 15–June 15 | May 1–June 15 | June 1–July 1 | June 1–July 1 | June 15–July 15 | July 1–20. |
| Salsify | May 15–June 1 | May 10–June 10 | May 20–June 20 | June 1–20 | June 1–July 1 | June 1–July 1. |
| Shallot | (2) | (2) | (2) | (2) | (2) | (2) |
| Sorrel | May 15–June 15 | May 1–June 15 | June 1–July 1 | June 1–July 15 | July 1–Aug. 1 | July 15–Aug. 15. |
| Soybean | | | | May 25–June 10 | June 1–25 | June 1–July 5. |
| Spinach | May 15–July 1 | June 1–July 15 | June 1–Aug. 1 | July 1–Aug. 15 | Aug. 1–Sept. 1 | Aug. 20–Sept. 10. |
| Spinach, New Zealand | | | | May 15–July 1 | June 1–July 15 | June 1–Aug. 1. |
| Squash, summer | June 10–20 | June 1–20 | May 15–July 1 | June 1–July 1 | do. | June 1–July 20. |
| Squash, winter | | | May 20–June 10 | June 1–15 | June 1–July 1 | June 1–July 1. |
| Sweetpotato | | | | | May 20–June 10 | June 1–15. |
| Tomato | June 20–30 | June 10–20 | June 1–20 | June 1–20 | June 1–20 | June 1–July 1. |
| Turnip | May 15–June 15 | June 1–July 1 | June 1–July 15 | June 1–Aug. 1 | July 1–Aug. 1 | July 15–Aug. 15. |
| Watermelon | | | May 1–June 15 | May 15–June 1 | June 1–June 15 | June 15–July 20. |

¹ Plants.² Generally spring-planted (table 4).

in a new place. Root cuttings are pieces of older roots 6 to 8 inches long and of the thickness of a lead pencil. They may be saved when preparing the larger roots for grating, or they may be purchased from seedsmen. A trench 4 or 5 inches deep is opened with a hoe and the root cuttings are placed at an angle with their tops near the surface of the ground. Plants from these cuttings usually make good roots the first year. As a rule, the plants in the home garden are allowed to grow from year to year, and portions of the roots are removed as needed. Pieces of roots and crowns remaining in the soil are usually sufficient to re-establish the plants.

There is very little choice in the matter of varieties of horseradish. Be sure, however, to obtain good healthy planting stock of a strain that is giving good results in the area where it is being

grown. Maliner Kren, an imported variety, is perhaps the best known sort sold by American seedsmen.

Poke

Poke, also known as scoke and garget, is grown and used to some extent as an early-spring vegetable. The plant grows wild along fences and around farmyards. Poke is a common carrier of the mosaic disease. Never grow it with crops susceptible to this disease.

Poke is propagated by taking portions from the crowns of the plant and setting them in a new place. The culture of poke is similar to that of asparagus. Poke must have a fertile soil; but, given that, no additional fertilizing is needed. It may be planted along one side of the garden, where it can remain for years. New plants arise from

TABLE 5.—*Latest dates, and range of dates, for safe fall planting of vegetables in the open—Continued*

[Average dates for first fall frost shown in figures 18 and 19]

| Crop | Planting dates for localities in which average date of first freeze is— | | | | | |
|----------------------------------|---|------------------|------------------|------------------|------------------|------------------|
| | Oct. 30 | Nov. 10 | Nov. 20 | Nov. 30 | Dec. 10 | Dec. 20 |
| Asparagus ¹ | Nov. 15-Jan. 1 | Dec. 1-Jan. 1 | | | | |
| Beans, lima | July 1-Aug. 1 | July 1-Aug. 15 | July 15-Sept. 1 | Aug. 1-Sept. 15 | Sept. 1-30 | Sept. 1-Oct. 1 |
| Beans, snap | July 1-Aug. 15 | July 1-Sept. 1 | July 1-Sept. 10 | Aug. 15-Sept. 20 | do | Sept. 1-Nov. 1 |
| Beet | Aug. 1-Sept. 1 | Aug. 1-Oct. 1 | Sept. 1-Dec. 1 | Sept. 1-Dec. 15 | Sept. 1-Dec. 31 | Sept. 1-Dec. 31 |
| Broccoli, sprouting | July 1-Aug. 15 | Aug. 1-Sept. 1 | Aug. 1-Sept. 15 | Aug. 1-Oct. 1 | Aug. 1-Nov. 1 | Do. |
| Brussels sprouts | do | do | do | do | do | Do. |
| Cabbage | Aug. 1-Sept. 1 | Sept. 1-15 | Sept. 1-Dec. 1 | Sept. 1-Dec. 31 | Sept. 1-Dec. 31 | Do. |
| Cabbage, Chinese | Aug. 1-Sept. 15 | Aug. 15-Oct. 1 | Sept. 1-Oct. 15 | Sept. 1-Nov. 1 | Sept. 1-Nov. 15 | Sept. 1-Dec. 1 |
| Carrot | July 1-Aug. 15 | Aug. 1-Sept. 1 | Sept. 1-Oct. 15 | Sept. 15-Dec. 1 | Sept. 15-Dec. 1 | Sept. 15-Dec. 1 |
| Cauliflower ¹ | July 15-Aug. 15 | do | Aug. 1-Sept. 15 | Aug. 15-Oct. 10 | Sept. 1-Oct. 20 | Sept. 15-Nov. 1 |
| Celery ¹ and celeriac | June 15-Aug. 15 | July 1-Aug. 15 | July 15-Sept. 1 | Aug. 1-Dec. 1 | Sept. 1-Dec. 31 | Oct. 1-Dec. 31 |
| Chard | June 1-Sept. 10 | June 1-Sept. 15 | June 1-Oct. 1 | June 1-Nov. 1 | June 1-Dec. 1 | June 1-Dec. 31 |
| Chervil and chives | (2) | (2) | Nov. 1-Dec. 31 | Nov. 1-Dec. 31 | Nov. 1-Dec. 31 | Nov. 1-Dec. 31 |
| Chicory, witloof | July 1-Aug. 10 | July 10-Aug. 20 | July 20-Sept. 1 | Aug. 15-Sept. 30 | Aug. 15-Oct. 15 | Aug. 15-Oct. 15 |
| Chicards ¹ | Aug. 1-Sept. 15 | Aug. 15-Oct. 1 | Aug. 25-Nov. 1 | Sept. 1-Dec. 1 | Sept. 1-Dec. 31 | Sept. 1-Dec. 31 |
| Cornsalad | Sept. 15-Nov. 1 | Oct. 1-Dec. 1 | Oct. 1-Dec. 1 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 |
| Corn, sweet | June 1-Aug. 1 | June 1-Aug. 15 | June 1-Sept. 1 | June 1-Sept. 1 | Do. | Do. |
| Cress, upland | Sept. 15-Nov. 1 | Oct. 1-Dec. 1 | Oct. 1-Dec. 1 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 | Do. |
| Cucumber | June 1-Aug. 1 | June 1-Aug. 15 | June 1-Aug. 15 | July 15-Sept. 15 | Aug. 15-Oct. 1 | Aug. 15-Oct. 1 |
| Dandelion | Aug. 15-Oct. 1 | Sept. 1-Oct. 15 | Sept. 1-Nov. 1 | Sept. 15-Dec. 15 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 |
| Eggplant ¹ | June 1-July 1 | June 1-July 15 | June 1-Aug. 1 | July 1-Sept. 1 | Aug. 1-Sept. 30 | Aug. 1-Sept. 30 |
| Endive | July 15-Aug. 15 | Aug. 1-Sept. 1 | Sept. 1-Oct. 1 | Sept. 1-Nov. 15 | Sept. 1-Dec. 31 | Sept. 1-Dec. 31 |
| Fennel, Florence | July 1-Aug. 1 | July 15-Aug. 15 | Aug. 15-Sept. 15 | do | Sept. 1-Dec. 1 | Sept. 1-Dec. 1 |
| Garlic | (2) | Aug. 1-Oct. 1 | Aug. 15-Oct. 1 | do | Sept. 15-Nov. 15 | Sept. 15-Nov. 15 |
| Horseradish ¹ | (2) | (2) | (2) | (2) | (2) | (2) |
| Kale | July 15-Sept. 1 | Aug. 1-Sept. 15 | Aug. 15-Oct. 15 | Sept. 1-Dec. 1 | Sept. 1-Dec. 31 | Sept. 1-Dec. 31 |
| Kohlrabi | Aug. 1-Sept. 1 | Aug. 15-Sept. 15 | Sept. 1-Oct. 15 | do | Sept. 15-Dec. 31 | Do. |
| Leek | (2) | (2) | Sept. 1-Nov. 1 | Sept. 1-Nov. 1 | Sept. 1-Nov. 1 | Sept. 15-Nov. 1 |
| Lettuce, head ¹ | Aug. 1-Sept. 15 | Aug. 15-Oct. 15 | do | Sept. 1-Dec. 1 | Sept. 15-Dec. 31 | Sept. 15-Dec. 31 |
| Lettuce, leaf | Aug. 15-Oct. 1 | Aug. 25-Oct. 1 | do | do | do | Do. |
| Muskmelon | July 1-July 15 | July 15-July 30 | | | | |
| Mustard | Aug. 15-Oct. 15 | Aug. 15-Nov. 1 | Sept. 1-Dec. 1 | Sept. 1-Dec. 1 | Sept. 1-Dec. 1 | Sept. 15-Dec. 1 |
| Okra | June 1-Aug. 10 | June 1-Aug. 20 | June 1-Sept. 10 | June 1-Sept. 20 | June 1-Sept. 30 | June 1-Sept. 30 |
| Onion ¹ | | Sept. 1-Oct. 15 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 |
| Onion, seed | | | Sept. 1-Nov. 1 | Sept. 1-Nov. 1 | Sept. 1-Nov. 1 | Sept. 15-Nov. 1 |
| Onion, sets | | Oct. 1-Dec. 1 | Nov. 1-Dec. 31 | Nov. 1-Dec. 31 | Nov. 1-Dec. 31 | Nov. 1-Dec. 31 |
| Parsley | Aug. 1-Sept. 15 | Sept. 1-Nov. 15 | Sept. 1-Dec. 31 | Sept. 1-Dec. 31 | Sept. 15-Dec. 31 | Sept. 1-Dec. 31 |
| Parsnip | (2) | (2) | Aug. 1-Sept. 1 | Sept. 1-Nov. 15 | Sept. 1-Dec. 1 | Sept. 1-Dec. 1 |
| Peas, garden | Aug. 1-Sept. 15 | Sept. 1-Nov. 1 | Oct. 1-Dec. 1 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 |
| Peas, black-eye | June 1-Aug. 1 | June 15-Aug. 15 | July 1-Sept. 1 | July 1-Sept. 10 | July 1-Sept. 20 | July 1-Sept. 20 |
| Pepper ¹ | June 1-July 20 | June 1-Aug. 1 | June 1-Aug. 15 | June 15-Sept. 1 | Aug. 15-Oct. 1 | Aug. 15-Oct. 1 |
| Potato | July 20-Aug. 10 | July 25-Aug. 10 | Aug. 10-Sept. 15 | Aug. 1-Sept. 15 | Aug. 1-Sept. 15 | Aug. 1-Sept. 15 |
| Radish | Aug. 15-Oct. 15 | Sept. 1-Nov. 15 | Sept. 1-Dec. 1 | Sept. 1-Dec. 31 | do | Oct. 1-Dec. 31 |
| Rhubarb ¹ | Nov. 1-Dec. 1 | | | | | |
| Rutabaga | July 15-Aug. 1 | July 15-Aug. 15 | Aug. 1-Sept. 1 | Sept. 1-Nov. 15 | Oct. 1-Nov. 15 | Oct. 15-Nov. 15 |
| Salsify | June 1-July 10 | June 15-July 20 | July 15-Aug. 15 | Aug. 15-Sept. 30 | Aug. 15-Oct. 15 | Sept. 1-Oct. 31 |
| Shallot ² | | Aug. 1-Oct. 1 | Aug. 15-Oct. 1 | Aug. 15-Oct. 15 | Sept. 15-Nov. 1 | Sept. 15-Nov. 1 |
| Sorrel | Aug. 1-Sept. 15 | Aug. 15-Oct. 1 | Aug. 15-Oct. 15 | Sept. 1-Nov. 15 | Sept. 1-Dec. 15 | Sept. 1-Dec. 31 |
| Soybean | June 1-July 15 | June 1-July 25 | June 1-July 30 | June 1-July 30 | June 1-July 30 | June 1-July 30 |
| Spinach | Sept. 1-Oct. 1 | Sept. 15-Nov. 1 | Oct. 1-Dec. 1 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 | Oct. 1-Dec. 31 |
| Spinach, New Zealand | June 1-Aug. 1 | June 1-Aug. 15 | June 1-Aug. 15 | June 1-Aug. 20 | June 1-Sept. 1 | June 1-Oct. 1 |
| Squash, summer | do | June 1-Aug. 10 | June 1-Aug. 20 | June 1-Sept. 1 | June 1-Sept. 15 | June 1-Sept. 1 |
| Squash, winter | June 10-July 10 | June 20-July 20 | July 1-Aug. 1 | July 15-Aug. 15 | Aug. 1-Sept. 1 | Aug. 1-Sept. 1 |
| Sweet potato | June 1-15 | June 1-July 1 | June 1-July 1 | June 1-July 1 | June 1-July 1 | June 1-July 1 |
| Tomato | June 1-July 1 | June 1-July 15 | June 1-Aug. 1 | Aug. 1-Sept. 1 | Aug. 15-Oct. 1 | Sept. 1-Nov. 1 |
| Turnip | Aug. 1-Sept. 15 | Sept. 1-Oct. 15 | Sept. 1-Nov. 15 | Sept. 1-Nov. 15 | Oct. 1-Dec. 1 | Oct. 1-Dec. 31 |
| Watermelon | July 1-July 15 | July 15-July 30 | | | | |

¹ Plants.² Generally spring-planted (table 4).

the old, and a few crowns spaced 2 to 3 feet apart soon occupy as much space as the average gardener cares to give to poke.

The young shoots that come up first in spring are taken just as they come through the loose earth and while they are still white and tender. Mulching with leaves or straw helps keep the shoots white and tender. Cut the shoots in the same way as asparagus, **but be careful not to take any part of the root, because it contains a poisonous alkaloid.**

Rhubarb

Rhubarb thrives best in regions having cool moist summers and winters cold enough to freeze the ground to a depth of several inches. It is not adapted to most parts of the South, but in certain areas of higher elevation it does fairly well. A

few hills along the garden fence will supply all that a family can use.

Any deep, well-drained, fertile soil is suitable for rhubarb. Spade the soil or plow it to a depth of 12 to 16 inches and mix in rotted manure, leaf-mold, decayed hardwood leaves, sods, or other form of organic matter. The methods of soil preparation suggested for asparagus are suitable for rhubarb. As rhubarb is planted in hills 3 to 4 feet apart, however, it is usually sufficient to prepare each hill separately.

Rhubarb plants may be started from seed and transplanted, but seedlings vary from the parent plant. The usual method of starting the plants is to obtain pieces of crowns from established hills and set them in prepared hills. Top-dress the planting with a heavy application of manure in either early spring or late fall. Fresh horse ma-

nure applied over the hills during early spring greatly hastens growth, or forces the plant.

If plenty of manure is used, rhubarb needs little if any commercial fertilizer. However, a pound of complete commercial fertilizer high in nitrogen applied around each hill every year insures an abundant supply of plant food. Lacking manure the plants can be mulched with green grass or weeds, and commercial fertilizer may be applied more liberally. Some manure is very desirable, however.

Remove seedstalks as soon as they form. No leaf stems should be harvested before the second year and but few until the third. Moreover, the harvest season must be largely confined to early spring. The hills should be divided and reset every 7 or 8 years. Otherwise, they become too thick and produce only slender stems.

Strawberry (Linnaeus), Chipman's Canada Red, and Victoria are standard varieties. Use only the leafstalk as a food. **Rhubarb leaves contain injurious substances, including oxalic acid. Never use them for food.**

Sorrel

Sorrel is a perennial that is usually started from seeds. It requires a rich, mellow, well-drained soil. Rows may be of any convenient distance apart. Thin the plants to about 8 inches apart in the rows. If the leaves alone are gathered and the plants are cultivated to prevent the growth of weeds, a planting should last 3 or 4 years. French Broad Leaf is a well-known variety.

Greens

Greens are usually the leaves and leaf stems of immature plants, which in their green state are boiled for food. Young, tender branches of certain plants, New Zealand spinach, for example, are also used this way. All the plants treated here as greens except New Zealand spinach are hardy vegetables, most of them adapted to fall sowing and winter culture over the entire South and in the more temperate parts of the North. Their culture may be extended more widely in the North by growing them with some protection, such as mulching or frames.

Chard

Chard, or Swiss chard (fig. 22), is a type of beet that has been developed for its tops instead of its roots. Crop after crop of the outer leaves may be harvested without injuring the plant. Only one planting is necessary, and a row 30 to 40 feet long will supply a family for the entire summer. Each seed cluster contains several seeds, and fairly wide spacing of the seeds facilitates thinning. The culture of chard is practically the same as that of beets, but the plants grow larger and need to be thinned to at least 6 inches apart in the row. Chard needs a rich, mellow soil, and it is sensitive to soil acidity.



Figure 22.—Swiss chard, especially suitable for hot-weather culture.

Witloof Chicory

Witloof chicory, or French endive, is grown for both roots and tops. It is a hardy plant, not especially sensitive to heat or cold. It does, however, need a deep, rich, loamy soil without too much organic matter. The tops are sometimes harvested while young. The roots are lifted in autumn and placed in a box or bed of moist soil in a warm cellar for forcing. They must be covered with a foot or two of manure or a few inches of sand. Under this covering the leaves form in a solid head, known on the market as witloof.

The culture of chicory is simple. Sow the seeds in spring or early summer in drills about 18 inches apart. Later, thin the plants to 6 or 8 inches apart in the rows. If sown too early the plants shoot to seed and are worthless for forcing. The kind known as witloof is most generally used.

Collards

Collards are grown and used about like cabbage. They withstand heat better than other members of the cabbage group, and are well liked in the South for both summer and winter use. Collards do not form a true head, but a large rosette of leaves, which may be blanched by tying together.

Cornsalad

Cornsalad is also known as lamb's-lettuce and fetticus. Sow the seed in early spring in drills and cultivate the plants the same as lettuce or mustard. For an extra early crop, plant the seed in the autumn and cover the plants lightly through the winter. In the Southern States the covering is not necessary, and the plants are ready for use in February and March. The leaves are frequently used in their natural green state, but they may be blanched by covering the rows with anything that will exclude light.

Dandelion

Dandelions are hardy and are adapted to much the same conditions as kale and mustard. They will grow on almost any garden soil. Sow the seeds in rows about 18 inches apart and cover them to a depth of about half an inch. Thin the plants to 8 to 12 inches apart in the rows. In the colder parts of the country it may be desirable to mulch slightly during the winter, using leaves, straw, or strawy manure. Early the following spring the plants will be ready for use as greens. In the South, the seed may be sown in the autumn, and the plants will be ready for use in the spring. Blanching by covering the plants with paper or by setting two boards lengthwise, in the form of an inverted V, over the row makes the leaves more tender and also partially destroys the bitter taste.

Kale

Kale, or borecole, is hardy and lives over winter in latitudes as far north as northern Maryland and southern Pennsylvania and in other areas where similar winter conditions prevail. It is also resistant to heat and may be grown in summer. Its real merit, however, is as cool-weather greens.

Kale is a member of the cabbage family. The best garden varieties are low-growing, spreading plants, with thick, more or less crinkled leaves (fig. 23). Dwarf Blue Scotch, Scotch Curled, and Siberian are well-known garden varieties.

No other plant is so well adapted to fall sowing throughout a wide area of both North and South

or in areas characterized by winters of moderate severity. Kale may well follow some such early-season vegetable as green beans, potatoes, or peas.

In the autumn the seed may be broadcast very thinly and then lightly raked into the soil. Except for spring sowings, made when weeds are troublesome, sow kale in rows 18 to 24 inches apart and later thin the plants to about a foot apart.

Kale may be harvested either by cutting the entire plant or by taking the larger leaves while young. Old kale is tough and stringy.

Mustard

Mustard grows well on almost any good soil. As the plants require but a short time to reach the proper stage for use, frequent sowings are recommended. Sow the seeds thickly in drills as early as possible in the spring or, for late use, in September or October. The forms of Indian mustard, the leaves of which are often curled and frilled, are generally used. Southern Curled and Elephant Ear are common sorts.

Spinach

Spinach, a hardy cool-weather plant, withstands winter conditions in the South. In most of the North, spinach is primarily an early-spring and late-fall crop, but in some areas, where summer temperatures are mild, it may be grown continuously from early spring until late fall. It should be emphasized that summer and winter culture of spinach is possible only where moderate temperatures prevail.

Spinach will grow on almost any well-drained, fertile soil where sufficient moisture is available. It is very sensitive to acid soil. If a soil test shows the need, apply lime to the part of the garden used for spinach, regardless of the treatment given the rest of the area.

The application of 100 pounds of rotted manure and 3 to 4 pounds of commercial fertilizer to each 100 square feet of land is suitable for spinach in the home garden. Broadcast both manure and fertilizer and work them in before sowing the seed.

Long Standing Bloomsdale is perhaps the most popular variety seeded in spring. It is attractive, grows quickly, is very productive, and will stand for a moderate length of time before going to seed. Virginia Savoy and Old Dominion are valuable varieties for fall planting, as they are resistant to yellows, or blight, and are very cold-hardy. These two varieties are not suitable for the spring crop, as they produce seedstalks too early. For horse or tractor cultivation, the rows of the garden should be not less than 24 inches apart; when land is plentiful they may be 30 inches apart. For wheel-hoe or hand work, the rows should be 14 to 16 inches apart. Spinach may be drilled by hand in furrows about 1 inch deep and covered with fine earth not more than $\frac{1}{2}$ inch deep, or it may be drilled with a seed drill, which distributes the



Figure 23.—Kale, a hardy green.

seed more evenly than is ordinarily possible by hand. Thin the plants to 3 or 4 inches apart before they crowd in the row.

New Zealand Spinach

New Zealand spinach is not related to common spinach. It is a large plant, with thick, succulent leaves and stems, and grows with a branching, spreading habit to a height of 2 or more feet. It thrives in hot weather and is grown as a substitute in seasons when ordinary spinach cannot withstand the heat. New Zealand spinach thrives on soils suitable for common spinach. Because of their larger size, these plants must have more room. The rows should be at least 3 feet apart, with the plants about 1½ feet apart in the rows. As prompt germination may be difficult, the seeds should be soaked for 1 or 2 hours in water at 120° F. before being planted. They may be sown, 1 to 1½ inches deep, as soon as danger of frost is past. Successive harvests of the tips may be made from a single planting, as new leaves and branches are readily produced. Care must be taken not to remove too large a portion of the plant at one time.

Turnip Greens

Varieties of turnips usually grown for the roots are also planted for the greens. Shogoin is the most favorable variety for greens. It is resistant to aphid damage and produces fine-quality white roots if allowed to grow. Seven Top is a leafy sort that produces no edible root. As a rule, sow turnips to be used for greens thickly and then thin them, leaving all but the greens to develop as a root crop. Turnip greens are especially adapted to winter and early-spring culture in the South. The cultural methods employed are the same as those for turnip and rutabaga (p. 35).

Salad Crops

The group known as salad crops includes vegetables that are usually eaten raw with salt, pepper, vinegar, and salad oil, or with mayonnaise or other dressings. This classification is entirely one of convenience; some vegetables not included in this group are used in the same way. Some members of this class may be cooked and used as greens.

Celery

Celery can be grown in home gardens in most parts of the country at some time during the year. It is a cool-weather crop and adapted to winter culture in the lower South. In the upper South and in the North it may be grown either as an early-spring or as a late-fall crop. Farther north in certain favored locations it can be grown throughout the summer.

Rich, moist but well-drained, deeply prepared, mellow soil is essential for celery. Soil varying from sand to clay loam and to peat may be used as long as these requirements are met. Unless the ground is very fertile, plenty of well-rotted barn-

yard manure, supplemented by liberal applications of commercial fertilizer, is necessary. For a 100-foot row of celery, four or five wheelbarrow loads of manure and 5 pounds of a high-grade complete fertilizer thoroughly mixed with the soil are none too much. Prepare the celery row a week or two before setting the plants.

The most common mistake with celery is failure to allow enough time for growing the plants. About 10 weeks are needed to grow good celery plants. Celery seed is small and germinates slowly. A good method is to place the seeds in a muslin bag and soak them overnight, then mix them with dry sand, distribute them in shallow trenches in the seed flats or seedbed, and cover them with leafmold or similar material to a depth of not more than ⅛ inch. Keep the bed covered with moist burlap sacks. Celery plants are very delicate and must be kept free from weeds. They are made more stocky by being transplanted once before they are set in the garden, but this practice retards their growth. When they are to be transplanted before being set in the ground, the rows in the seed box or seedbed may be only a few inches apart. When they are to remain in the box until transplanted to the garden, however, the plants should be about 2 inches apart each way. In beds, the rows should be 10 to 12 inches apart, with the seedlings 1 to 1½ inches apart in the row.

For hand culture celery plants are set in rows 18 to 24 inches apart; for horse or tractor cultivation 30 to 36 inches apart. The plants are spaced about 6 inches in the row. Double rows are about a foot apart. Set celery on a cool or cloudy day, if possible; and if the soil is at all dry, water the plants as described on page 16. If the plants are large, it is best to pinch off the outer leaves 3 or 4 inches from the base before setting. In bright weather it is well also to shade the plants for a day or two after they are set. Small branches bearing green leaves, stuck in the ground, protect the plants from intense sun without excluding air. As soon as the plants attain some size gradually work the soil around them to keep them upright. Be careful to get no soil into the hearts of the plants. Early celery is blanched by excluding the light with boards, paper, drain tiles, or other devices. Late celery may be blanched also by banking with earth or by storing in the dark. Banking celery with soil in warm weather causes it to decay.

Late celery may be kept for early-winter use by banking with earth and covering the tops with leaves or straw to keep them from freezing, or it may be dug and stored in a cellar or a coldframe, with the roots well embedded in moist soil. While in storage it must be kept as cool as possible without freezing.

For the home garden the Golden Self-Blanching and the Golden Plume are adapted for the early crop to be used during late summer, fall, and early

winter. For storage and for use after the holiday season, it is desirable to plant some such variety as Easy Blanching, Utah, or the old variety known as Giant Pascal. Emperor and Winter Queen are excellent varieties for late-fall and winter use.

Endive

Endive closely resembles lettuce in its requirements, except that it is less sensitive to heat. It may be substituted for lettuce when the culture of lettuce is impracticable. In the South, it is mainly a winter crop. In the North, it is grown in spring, summer, and autumn and is also forced in winter. Broad Leaved Batavian and Green Curled are good varieties (fig. 24). Broadleaved endive is known on the markets as escarole.



Figure 24.—Broad Leaved Batavian and Green Curled varieties of endive.

Cultural details are the same as those for head lettuce. When the plants are large and well-formed, draw the leaves together and tie them so that the heart will blanch. For winter use, lift the plants with a ball of earth, place them in a cellar or coldframe where they will not freeze, and tie and blanch them as needed.

Lettuce

Lettuce can be grown in any home garden. It is a cool-weather crop, being as sensitive to heat as any vegetable grown. In the South, lettuce culture is confined to late fall, winter, and spring. In colder parts of the South, lettuce may not live through the winter. In the North, lettuce culture is practically limited to spring and autumn. In some favored locations, such as areas of high altitude or in far-northern latitudes, lettuce grows to perfection in summer. Planting at a wrong season is responsible for most of the failures with this crop.

Any rich soil is adapted to lettuce, although the plant is sensitive to acid soil. A commercial fertilizer with a heavy proportion of phosphorus is recommended. Rotted manure may be used, but not fresh, strawy manure.

Start spring lettuce indoors or in a hotbed and transplant it to the garden when the plants have four or five leaves. Gardeners need not wait for the end of light frosts, as lettuce is not usually harmed by a temperature as low as 28° F., if the plants have been properly hardened. Allow about

6 weeks for growing the plants. For the fall crop the seed may be sown directly in the row and thinned; there is no gain in transplanting.

For horse or tractor cultivation, set lettuce plants 12 to 15 inches apart in rows 30 to 36 inches apart; for hand culture, about 14 to 16 inches apart each way. Where gardeners grow leaf lettuce or desire merely the leaves and not well-developed heads, the spacing in the rows may be much closer. In any case it is usually best to cut the entire plant instead of removing the leaves.

There are many excellent varieties of lettuce, all of which do well in the garden when conditions are right. Of the loose-leaf kinds, Black-Seeded Simpson, Grand Rapids, and Slobolt are among the best. Slobolt is heat-resistant and very desirable for warm-weather culture. Of the head-leaf sorts, May King, White Boston, Imperial 44, Imperial 847, and Great Lakes (fig. 25) are among the best. The May King and White Boston varieties require less time than the three others. Where warm weather comes early, it is seldom worth while to sow head lettuce seed in the open ground in the spring with the expectation of obtaining firm heads.



Figure 25.—Great Lakes variety of lettuce mulched with pine needles.

Parsley

Parsley is hardy to cold but sensitive to heat. It thrives under much the same temperature conditions as kale, lettuce, and spinach. If given a little protection it may be carried over winter through most of the North.

Parsley thrives on any good soil. As the plant is delicate during its early stages of growth, however, the land should be mellow.

Parsley seeds are small and germinate slowly. Soaking in water overnight hastens the germination. In the North, it is a good plan to sow the seeds indoors and transplant the plants to the garden, thereby getting a crop before hot weather. In the South, it is usually possible to sow the seed

directly in drills. For the fall crop in the North, row seeding is also practiced. After seeding, it is well to lay a board over the row for a few days until the first seedlings appear. After its removal day-to-day watering will insure germination of as many seeds as possible. Parsley rows should be 14 to 16 inches apart, with the plants 4 to 6 inches apart in the rows. A few feet will supply the family, and a few plants transplanted to the coldframe in the autumn will give a supply during early spring.

Upland Cress

Upland cress, sometimes erroneously called peppergrass, is a hardy plant. It may be sown in all the milder parts of the country in autumn. In the colder sections it is sown in early spring as soon as the ground can be worked. The seeds are small and must not be covered deeply. After the plants are well established, thin them to 4 to 6 inches apart in the rows. This is a short-season crop that should be planted in quick succession to insure a steady supply.

Water Cress

Water cress is one of the few vegetable crops that can be grown in wet surroundings. In the parts of the North having the more moderate temperatures, it grows practically the year round. Winter is its best season in the South. It is most easily produced in water from springs in limestone regions; the limestone regions of Virginia, Maryland, Kentucky, and the Ozarks give almost ideal conditions. A supply for the family may be grown in a small spring-fed brook or in a series of shallow pools where the water is about 1 foot deep. Care must be taken, though, to have a clean supply of water.

Water cress is started from seed and from pieces of plant. It is best to prepare the bed, using plenty of rotted manure, and to turn the water on after the seeds or cuttings are in place. Early spring is the best time to plant water cress. Often seeds or cuttings may be placed in the rich, moist soil at the edges of springs or brooks. The plant grows profusely in the wild state. A bed will yield a good crop the first season.

Root and Tuber-Root Crops

Potatoes in the North and sweetpotatoes in the South are grown in almost every garden. Beets, carrots, and turnips are also widely grown in gardens. The vegetables in this group may be used throughout the growing season and also be kept for winter.

Beet

The beet is well adapted to all parts of the country. It is fairly tolerant of heat; it is also resistant to cold. However, it will not withstand severe freezing. In the Northern States, where

winters are too severe, the beet is grown in spring, summer, and autumn.

Beets are sensitive to strongly acid soils, and it is wise to apply lime if a test shows the need for it. Good quality depends on quick development, and the land must be fertile, well-drained, and in good physical condition. Well-rotted manure, supplemented by commercial fertilizer having a high proportion of both phosphorus and potash, is recommended. Broadcast the manure and fertilizer before planting the seed.

Midsummer heat and drought may interfere with seed germination. By covering the seeds with sandy soil, leafmold, or other material that will not bake and by keeping the soil damp until the plants are up, much of this trouble can be avoided. Make successive sowings at intervals of about 3 weeks in order to have a continuous supply of young, tender beets throughout the season.

Where cultivating is by hand, the rows may be about 16 inches apart; where it is by horse, they must be wider. Beet seed as purchased consists of small balls, each containing several seeds. On most soils the seed should be covered to a depth of about an inch. After the plants are well established, thin them to stand 2 to 3 inches apart in the rows.

Early Wonder, Crosby Egyptian, and Detroit Dark Red are standard varieties suitable for early home-garden planting.

Carrot

Carrots are usually grown in the fall, winter, and spring in the South, providing an almost continuous supply. In the North, carrots can be grown and used through the summer and the surplus stored for winter. Carrots will grow on almost any type of soil as long as it is moist, fertile, loose, and free from clods and stones, but sandy loams and peats are best. Application of coarse manure immediately before the carrot crop is planted makes the roots prongy and rough. Use commercial fertilizer.

Because of their hardness, carrots may be seeded as early in the spring as the ground can be worked. Succession plantings at intervals of 3 weeks will insure a continuous supply of tender carrots. Cover carrot seed about $\frac{1}{2}$ inch on most soils; less, usually about $\frac{1}{4}$ inch, on heavy soils. With care in seeding, little thinning is necessary; carrots can stand some crowding, especially on loose soils. However, they should be no thicker than 10 to 15 plants per foot of row.

Red Core Chantenay, Danvers Half Long, Nantes, and Emperor are standard sorts. Carrots should be stored before hard frosts occur, as the roots may be injured by cold.

Celeriac

Celeriac, or turnip-rooted celery, has been developed for the root instead of the top. Its culture is the same as that of celery, and the enlarged

roots can be used at any time after they are big enough. Celeriac may be stored for winter use, but only the late-summer crop. In areas having mild winters the roots may be left in the ground and covered with a mulch of several inches of straw or leaves, or they may be lifted, packed in moist sand, and stored in a cool cellar.

Chervil

Chervil comes in two distinct types, salad chervil and turnip-rooted chervil. Salad chervil is grown about like parsley. The seeds must be bedded in damp sand for a few weeks before being sown; otherwise, their germination is very slow.

Turnip-rooted chervil thrives in practically all parts of the country where the soil is fertile and the moisture sufficient. In the South, the seeds are usually sown in the fall, but they may not germinate until spring. In the North, the seeds may be sown in the autumn to germinate in the spring; or the plants may be started indoors in late winter and transplanted to open ground later on. The spacing and culture of chervil are about the same as for beets and carrots.

Dasheen

The dasheen, a large-growing plant, is related to the ordinary elephant's-ear and looks like it. It is a long-season crop, adapted for culture only in the South, where there is normally a very warm frostless season of at least 7 months. It needs a rich loamy soil, an abundance of moisture with good drainage, and a fairly moist atmosphere. Small tubers—from 2 to 5 ounces in weight—are used for planting in much the same way as potatoes. Planting may be done 2 or 3 weeks before frosts are over, and the season may be lengthened by starting the plants indoors and setting them out after frost is past. Set the plants in $3\frac{1}{2}$ - to 4-foot rows, about 2 feet apart in the rows. Dasheen tubers may be dug and dried on the ground in much the same way as sweetpotatoes, and stored at 50° F. with ventilation.

Parsnip

The parsnip is adapted to culture over a wide portion of the United States. It must have warm soil and weather at planting time, but does not thrive in midsummer in the South.

In many parts of the South parsnips are grown and used during early summer. They should not reach maturity during midsummer, however. Furthermore, it is difficult to obtain good germination in the summer, which limits their culture during the autumn.

Any deep, fertile soil will grow parsnips, but light, friable soils, with no tendency to bake, are best. Stony or lumpy soils are objectionable; they may cause rough, prongy roots. Direct contact of coarse manure with the roots is undesirable for the same reason.

Parsnip seed must be fresh—not more than a year old—and it is well to sow rather thickly

and thin to about 3 inches apart. Parsnips germinate slowly, but it is possible to hasten germination by covering the seed with leafmold, sand, a mixture of sifted coal ashes and soil, peat, or some similar material that will not bake. Rolling a light soil over the row or trampling it firmly after seeding usually hastens and improves germination. Hollow Crown (Guernsey) and All American are suitable varieties.

Parsnips may be dug and stored in a cellar or pit or left in the ground until used. Roots placed in cold storage gain in quality faster than those left in the ground, and freezing in the ground in winter improves the quality.

There is no basis for the belief that parsnips that remain in the ground over winter and start growth in the spring are poisonous. All reported cases of poisoning from eating so-called wild parsnips have been traced to water hemlock (*Cicuta*), which belongs to the same family and resembles the parsnip somewhat.

Be very careful in gathering wild plants that look like the parsnip.

Potato

Potatoes, when grown under favorable conditions, are one of the most productive of all vegetables in terms of food per unit area of land.

Potatoes are a cool-season crop; they do not thrive in midsummer in the southern half of the country. Any mellow, fertile, well-drained soil is suitable for potato production. Stiff, heavy clay soils often produce misshapen tubers. Potatoes respond to a generous use of commercial fertilizer, but if the soil is too heavily limed, the tubers may be scabby. Farmyard manure, if used, should be well decomposed and thoroughly mixed into the soil a week or two in advance of planting.

Commercial 5-8-5 or 5-8-7 mixtures applied at 1,000 to 2,000 pounds to the acre (approximately $7\frac{1}{2}$ to 15 pounds to each 100-foot row) usually provide enough plant food for a heavy crop. The lower rate of application is sufficient for very fertile soils; the higher rate for less fertile ones. Commercial fertilizer can be applied at the time of planting, but it should be mixed with the soil in such a way that the seed pieces will not come in direct contact with it.

In the North, plant two types of potatoes—one to provide early potatoes for summer use, the other for storage and winter use. Early varieties include Irish Cobbler, Warba, and Red Warba. The best late varieties are Katahdin, Green Mountain, Sebago, Sequoia, Pontiac, and Rural New Yorker. The Irish Cobbler is the most widely adapted of the early varieties and the Katahdin of the late. In the Great Plains States, the Triumph is preferred for summer use; the Katahdin and Rural New Yorker for winter. In the Pacific Northwest, the Russet Burbank (Netted Gem), White Rose, Katahdin, and Sebago are used. In the Southern States, the Irish Cobbler and Tri-

umph are widely grown. The use of certified seed is nearly always advisable.

In preparing seed potatoes for planting, cut them into blocky rather than wedge-shaped pieces. Each piece should be about 1½ ounces in weight and have at least one eye. Medium-sized tubers weighing 5 to 7 ounces are cut to best advantage.

Plant early potatoes as soon as weather and soil conditions permit. Fall preparation of the soil often makes it possible to plant the early crop without delay in late winter or early spring. Potatoes require 2 to 3 weeks to come up, depending on depth of planting and the temperature of the soil. In some sections the ground may freeze slightly, but this is seldom harmful unless the sprouts have emerged. Prolonged cold, wet weather after planting is likely to cause the seed pieces to rot. Hence, avoid too early planting. Young potato plants are often damaged by frost, but they usually renew their growth quickly from uninjured portions of the stems.

Do not dig potatoes intended for storage until the tops are mature. Careful handling to avoid skinning is desirable, and protection from long exposure to light is necessary to prevent their becoming green and unfit for table use. Store in a well-ventilated place where the temperature is low, 45° to 50° F. if possible, but where there is no danger of freezing. Treatment of the tubers with Bar-Sprout, or similar hormone compound, to retard sprouting is usually desirable. Treat them as soon as possible after harvest and follow carefully the directions on the package of treating material.

Radish

Radishes are hardy to cold, but they cannot withstand heat. In the South, they do well in autumn, winter, and spring. In the North, they may be grown in spring and autumn, and in sections having mild winters they may be grown in coldframes at that season. In high altitudes and in northern locations with cool summers, radishes thrive from early spring to late autumn.

Radishes are not sensitive to the type of soil so long as it is rich, moist, and friable. Apply additional fertilizer when the seeds are sown; conditions must be favorable for quick growth. Radishes that grow slowly have a pungent flavor and are undesirable.

Radishes mature the quickest of our garden crops. They remain in prime condition only a few days, which makes small plantings at week or 10-day intervals advisable. A few yards of row will supply all the radishes a family will consume during the time the radishes are at their best.

There are two types of radishes—the mild, small, quick-maturing sorts such as Scarlet Globe, French Breakfast, and Cincinnati Market, all of which reach edible size in from 20 to 40 days; and the more pungent, large, winter radishes such as Long Black Spanish and China Rose, which re-

quire 75 days or more for growth. Plant winter radishes so that they will reach a desirable size in the autumn. Gather and store them like other root crops.

Salsify

Salsify, or vegetable oyster, may be grown in practically all parts of the country. It is similar to parsnips in its requirements but needs a slightly longer growing season. For this reason it cannot be grown as far north as parsnips. Salsify, however, is somewhat more hardy and can be sown earlier in the spring.

Thoroughly prepare soil for salsify to a depth of at least a foot. Lighten heavy garden soil by adding sifted coal ashes from nonlignite coal, sand, or comparable material. Salsify must have plenty of plant food, but no fresh, rough manure, which causes rough, prongy roots.

Sandwich Island is the best-known variety. A half ounce of seed will sow a 50-foot row, enough for most families. Always use fresh seed; salsify seed retains its vitality only 1 year.

Salsify may be left in the ground over winter or lifted and stored like parsnips or other root crops.

Sweetpotato

Sweetpotatoes succeed best in the South, but they are grown in home gardens as far north as southern New York and southern Michigan. They can be grown even farther north, in sections having especially mild climates, such as the Pacific Northwest. In general, sweetpotatoes may be grown wherever there is a frost-free period of about 150 days with relatively high temperature. Big-Stem Jersey and Little-Stem Jersey are the commonest dry-fleshed varieties, and the Porto Rico and Nancy Hall are two of the best of the moist type.

A well-drained, moderately deep sandy loam of medium fertility is best for sweetpotatoes. Heavy clays and very deep loose-textured soils encourage the formation of long stringy roots. For best results the soil should be moderately fertilized throughout. If applied under the rows, the fertilizer should be well mixed with the soil. Fresh manure should be avoided.

In most of the area over which sweetpotatoes are grown it is necessary to start the plants in a hotbed, because the season is too short to produce a good crop after the weather warms enough to start plants outdoors. Bed roots used for seed close together in a hotbed and cover them with about 2 inches of sand or fine soil, such as leafmold. It is not safe to set the plants in the open ground until the soil is warm and the weather settled. Toward the last ventilate the hotbed freely to harden the plants.

The plants are usually set on top of ridges, 3½ to 4 feet apart, with the plants about 12 inches

apart in the row. When the vines have covered the ground no further cultivation is necessary, but some additional hand weeding may be required.

Dig sweetpotatoes a short time before frost, on a bright, drying day when the soil is not too wet to work easily. On a small scale they may be dug with a spading fork, great care being taken not to bruise or injure the roots. Let the roots lie exposed for 2 or 3 hours to dry thoroughly; then put them in containers and place them in a warm room to cure. The proper curing temperature is 85° F. Curing for about 10 days is followed by storage at 50° to 55°. A small crop may be cured around the kitchen stove and later stored where there is no danger of their becoming too cold. Handle sweetpotatoes as little as possible, especially after they are cured.

Turnip and Rutabaga

Turnips and rutabagas, similar cool-season vegetables, are among the most commonly grown and widely adapted root crops in the United States. They are grown in the South chiefly in the fall, winter, and spring; in the North, largely in the spring and autumn. Rutabagas do best in the more northerly areas; turnips are better for gardens south of the latitude of Indianapolis, Ind., or northern Virginia.

Turnips reach a good size in from 60 to 80 days, but rutabagas need about a month longer. Being susceptible to heat and hardy to cold, these crops should be planted as late as possible for fall use, allowing time for maturity before hard frost. In the South, turnips are very popular in the winter and spring. In the North, however, July to August seeding, following early potatoes, peas, or spinach, is the common practice.

Land that has been in a heavily fertilized crop, such as early potatoes, usually gives a good crop without additional fertilizing. The soil need not be prepared deeply, but the surface should be fine and smooth. For spring culture, row planting similar to that described for beets is the best practice. The importance of planting turnips as early as possible for the spring crop is emphasized. When seeding in rows, cover the seeds lightly; when broadcasting, rake the seeds in lightly with a garden rake. A half ounce of seed will sow a 300-foot row or broadcast 300 square feet. Turnips may be thinned as they grow, and the tops used for greens.

Although there are both white-fleshed and yellow-fleshed varieties of turnips and rutabagas, most turnips are white-fleshed and most rutabagas are yellow-fleshed. Purple Top White Globe is the most popular white-fleshed turnip; Golden Ball (Orange Jelly) is the most popular yellow-fleshed variety. American Purple Top is the commonly grown yellow-fleshed rutabaga; Sweet German (White Swede, Sweet Russian) is the most widely used white-fleshed variety.

Turnip-Rooted Parsley

The root is the edible portion of turnip-rooted parsley. The flesh is whitish and dry, with much the same flavor as celeriac.

Turnip-rooted parsley requires the same climate, soil, and culture as parsley. It can withstand much cold, but is difficult to start in dry, hot weather. This vegetable may remain in the ground until after hard frosts. It may be lifted and stored like other root crops.

Vine Crops (Cucurbits)

The vine crops, including cucumbers, muskmelons, pumpkins, squashes, watermelons, and citrons, are similar in their cultural requirements. In importance to the home gardener they do not compare with some other groups, especially the root crops and the greens, but there is a place in most gardens for at least bush squashes and a few hills of cucumbers. They all make rank growth and require much space. In large gardens, muskmelons and watermelons are often desirable.

Cucumber

Cucumbers are a warm-weather crop. They may be grown during the warmer months over a wide portion of the country, but are not adapted to winter growing in any but a few of the most southerly locations. Moreover, the extreme heat of midsummer in some places is too severe, and there cucumber culture is limited to spring and autumn.

The cucumber demands an exceedingly fertile, mellow soil. In addition to the manuring and fertilizing suggested earlier in this bulletin (p. 2) application of some well-rotted manure and commercial fertilizer is advisable under the rows or hills. But be sure that the manure contains no remains of any vine crops; they might carry injurious diseases. Three or four wheelbarrow loads of manure and 5 pounds of commercial fertilizer to a 50-foot drill or each 10 hills are enough. Mix the manure and fertilizer well with the top 8 to 10 inches of soil.

For an early crop, the seed may be started in berry boxes, plant bands, or pots, or on sods in a hotbed, and moved to the garden after danger of late frost is past. During early growth and in cool periods cucumbers may be covered with plant protectors made of panes of glass with a top of cheesecloth, parchment paper, or muslin. A few hills will supply the family with pickling and slicing stock.

When the seed is planted in drills, the rows should be 6 or 7 feet apart, with the plants thinned to 2 to 3 feet apart in the rows. In the hill method of planting, the hills should be at least 6 feet apart each way, with the plants thinned to 2 in each hill. It is always wise to plant 8 or 10 seeds in each hill, thinning to the desired stand. Cover the seeds to a depth of about ½ inch. If the soil

is inclined to bake, cover them with loose earth, such as a mixture of soil and sifted coal ashes, sand, or other material that will not harden and keep the plants from coming through.

When cucumbers are grown primarily for pickling, plant one of the special small-size pickling varieties, such as Chicago Pickling or National Pickling; if they are grown for slicing, plant such varieties as White Spine and Early Fortune. It is usually desirable to plant a few hills of each type, but both types can be used for either purpose.

Cucumbers require almost constant vigilance to prevent destructive attacks by cucumber beetles. These insects not only eat the foliage but also spread cucumber wilt and other serious diseases. During the early stages of growth the plants may be protected by small frames, such as those made of a wooden barrel hoop tacked to three pegs and covered with cheesecloth or mosquito netting. The edges of the netting should be covered with earth to keep it from blowing off and to keep insects out. The covering may be removed while the plants are being cultivated, but it must be immediately replaced. When the vines begin to run, remove the covering.

Success in growing cucumbers depends largely on the control of diseases and insect pests that attack the crop.

Removal of the fruits before any hard seeds form materially lengthens the life of the plants and increases the size of the crop.

Muskmelon

The climatic, soil, and cultural requirements of muskmelons are about the same as for cucumbers, except that they are less tolerant of high humidity and rainy weather. They develop most perfectly on light-textured soils. The plants are vigorous growers, and need a somewhat wider spacing than cucumbers.

Emerald Gem, Hale's Best, and Rocky Ford, the last-named a type not a variety, are usually grown in the home garden. Where powdery mildew is prevalent, Powdery Mildew Resistant Nos. 45, 5, and 6 are better adapted. Osage and Pride of Wisconsin (Queen of Colorado) are desirable home-garden sorts, particularly in the Northern States. Sweet Air (Knight) is a popular sort in the Maryland-Virginia area.

The Casaba and Honey Dew are well adapted only to the West, where they are grown under irrigation.

Pumpkin

Pumpkins are sensitive to both cold and heat. In the North, they cannot be planted until settled weather; in the South, they do not thrive during midsummer.

The gardener is seldom justified in devoting any part of a limited garden area to pumpkins, because many other vegetables give greater returns from

the same space. However, in gardens where there is plenty of room and where they can follow an early crop like potatoes, pumpkins can often be grown to advantage.

The pumpkin is one of the few vegetables that thrive under partial shade. Therefore it may be grown among sweet corn or other tall plants. Small Sugar and Connecticut Field are well-known orange-yellow-skinned varieties. The Kentucky Field has a grayish-orange rind with salmon flesh. All are good-quality, productive varieties.

Hills of pumpkins, containing one to two plants, should be at least 10 feet apart each way. Pumpkin plants among corn, potato, or other plants usually should be spaced 8 to 10 feet apart in every third or fourth row.

Gather and store pumpkins before they are injured by hard frosts. They keep best in a well-ventilated place where the temperature is a little above 50° F.

Squash

Squashes are among the most commonly grown garden plants. They do well in practically all parts of the United States where the soil is fertile and moisture sufficient. Although sensitive to frost, squashes are more hardy than melons and cucumbers. In the warmest parts of the South they may be grown in winter. The use of well-rotted manure thoroughly mixed with the soil is recommended.

There are two classes of squash varieties, summer and winter. The summer class includes the Bush Scallop, known in some places as the Cym-ling, the Summer Crookneck, and Straightneck. It also includes the vegetable marrows, of which the best known sort is Italian Vegetable Marrow (Cocozelle). All the summer squashes and the marrows must be used while young and tender, when the rind can be easily penetrated by the thumbnail. The winter squashes include varieties such as Hubbard, Delicious, Table Queen (Acorn), and Boston Marrow. They have hard rinds and are well adapted for storage.

Summer varieties, like yellow Straightneck (fig. 26), should be gathered before the seeds ripen or the rinds harden, but the winter sorts will not keep unless well-matured. They should be taken in before hard frosts and stored in a dry, moderately warm place, such as on shelves in a basement with a furnace. Under favorable conditions such varieties as Hubbard may be kept until midwinter.

Watermelon

Only gardeners with a great deal of space can afford to grow watermelons. Moreover, they are rather particular in their soil requirements, a sand or sandy loam being best. Watermelon hills should be at least 8 feet apart. The old plan of mixing a half wheelbarrow load of rotted manure



Figure 26.—Mulched plant of Yellow Straightneck summer squash.

with the soil in each hill is good, provided the manure is free from the remains of cucurbit plants that might carry disease. A half pound of commercial fertilizer also should be thoroughly mixed with the soil in the hill. It is a good plan to place several seeds in a ring about 1 foot in diameter in each hill. Later the plants should be thinned to two to each hill.

Improved Kleckley Sweet, Halbert Honey, Stone Mountain, Congo, Dixie Queen, and Garrison are suitable varieties for the home garden. Sweet Siberian is a small-size, yellow-fleshed sort that is especially desirable where the growing season is short. Winter King and Queen has a cream-colored, striped skin and red flesh. The fruits are small and the melon is adapted to storage for several months. Improved Kleckley Sweet No. 6, Stone Mountain No. 5, and Leesburg are well-known varieties that should be planted on fusarium-wilt-infested soil.

The preserving type of watermelon—citron—is not edible when raw. Its culture is the same as that for watermelon.

Legumes

Beans and peas are among our oldest and most important garden plants. The popularity of both is enhanced by their wide climatic and soil adaptation.

Beans

Green beans, both snap and lima, are more important than dry beans to the home gardener.

Snap beans cannot be planted until the ground is thoroughly warm, but succession plantings may be made every 2 weeks from that time until 7 or 8 weeks before frost. In the lower South and Southwest, green beans may be grown during the fall, winter, and spring, but they are not well adapted to midsummer. In the extreme South, beans are grown throughout the winter.

Green beans are adapted to a wide range of soils as long as the soils are well drained, reasonably fertile, and of such physical nature that they do not interfere with germination and emergence of the plants. Soil that has received a general application of manure and fertilizer should need no additional fertilization. When beans follow early crops that have been fertilized the residue of this fertilizer is often sufficient for the beans.

On very heavy lands it is well to cover the planted row with sand, a mixture of sifted coal ashes and sand, peat, leafmold, or other material that will not bake. Bean seed should be covered not more than 1 inch in heavy soils and 1½ inches in sandy soils. When beans are planted in hills they may be covered with plant protectors. These covers make it possible to plant somewhat earlier.

Topcrop (fig. 27), Stringless Green Pod, Tendergreen, Pencil Pod Black Wax, and Round Pod Kidney Wax are good bush varieties of snap beans. Brown-seeded or white-seeded Kentucky Wonders



Figure 27.—Topcrop, a round, green-podded snap bean of high quality, resistant to mosaic.

are the best pole varieties for snap pods. White Navy, White or Red Kidney, and the horticultural types are excellent for dry-shell purposes.

Two types of lima beans, called butter beans in the South, are grown in home gardens. Most of the more northerly parts of the United States, including the northern New England States and the northern parts of other States along the Canadian border, are not adapted to the culture of lima beans. Lima beans need a growing season of about 4 months with relatively high temperature; they cannot be planted safely until somewhat later than snap beans. The small butter beans mature in a shorter period than the large-seeded lima beans. The use of plant protectors over the seeds is an aid in obtaining earliness.

Lima beans may be grown on almost any fertile, well-drained, mellow soil, but it is especially desirable that the soil be light-textured and not subject to baking, as the seedlings cannot force their way through a hard crust. Covering with some material that will not bake, as suggested for other beans, is a wise precaution when using heavy soils. Lima beans need a soil somewhat richer than is necessary for kidney beans, but the excessive use of manure or fertilizer containing a high percentage of nitrogen should be avoided.

Both the small- and large-seeded lima beans are available in pole and bush varieties. In the South, the most commonly grown lima bean varieties are the Henderson Bush and Sieva pole. In the North, Henderson Bush, Thorogreen, and Clark's Bush are the most popular small-seeded bush varieties. Early Market is the earliest and most productive of the large-seeded bush varieties. Fordhook No. 242 (fig. 28) has become the most popular mid-season large, thick-seeded bush lima bean. King of the Garden and Challenger are the most popular large-seeded pole lima bean varieties.

Pole beans of the kidney and lima types require some form of support, as they normally make vines several feet long (fig. 29). A small sapling about 2 inches in diameter at the base and 7 or 8 feet long

makes a very satisfactory bean pole. Sawed stakes are objectionable because of their corners and smoothness, which makes it difficult for the beans to climb. Beans usually need some help in getting started up the poles. They twine in a counter-clockwise direction. Where poles are hard to get, beans may be trained to a trellis made by stretching a top and a bottom wire between posts and connecting them every foot or two with stout twine. Some gardeners plant pole beans along a fence or beside hills of corn, which serve as supports.



Figure 29.—Lima beans growing on poles.

Never cultivate or handle bean plants when they are wet; to do so is likely to spread disease. The advent of the Mexican bean beetle in the East has brought home gardeners there face to face with a difficult problem. Spraying or dusting is the best way to meet it.

Peas

Peas are a cool-weather crop. In the lower South they are grown at all seasons except summer; farther north, in spring and autumn. In the Northern States and at high altitudes, they may be grown from spring until autumn, although in many places summer heat is too severe and the season is practically limited to spring. A few succession plantings may be made at 10-day intervals. The later plantings rarely yield as well as the earlier ones. Plantings may be resumed as the cool weather of autumn approaches, but the yield is seldom as satisfactory as that from the spring planting.

Alaska and other smooth-seeded varieties are frequently used for planting in the early spring because of the supposition that they can germinate well in cold, wet soil. Laxton Progress, Little



Figure 28.—Fordhook No. 242 bush lima beans are vigorous, productive, and heat-resistant.

Marvel, Improved Gradus, and Hundredfold are recommended as suitable early varieties with wrinkled seeds. Alderman and Stratagem are approximately 2 weeks later than Progress, but under favorable conditions yield heavily. Alderman is a desirable variety for growing on brush or a trellis. Some of the early varieties, like Gradus, produce a somewhat larger crop when grown on supports. Peas grown on supports are less liable to destruction by birds.

Soybean

Soybeans are rapidly increasing in popularity in America, as gardeners become more familiar with them as a food crop. The soil and cultural requirements and methods of growing them are essentially the same as for bush forms of common beans. Soybeans, however, are slower growing than most garden beans, requiring 3 to 5 months for maturity, and warmer weather. They also are taller growing, the larger, later varieties requiring a greater distance between rows than dwarf snap beans. Small, early varieties may be planted in rows as close as 2 feet, but the larger, later ones require 3 feet between rows. The planting dates given in tables 4 and 5 are for midseason varieties (about 120 days), neither the earliest nor the latest kinds. Differences in time of development among varieties are so great that the gardener must choose the proper variety and know its time of maturity in making plans for planting in any particular locality.

As this crop is still rather new to gardeners, large seed supplies of many varieties are not generally available. Some of the more widely grown varieties and the number of days until their green edible stage when grown in the Corn Belt follow: Giant Green, 90 to 95 days; Bansei, 95 to 100 days; Jogun, 100 to 110 days; Hokkaido, 100 to 115 days; and Imperial, 110 to 120 days. In cooler sections the rate of development will be slower. Only the early varieties should be grown in the more northerly States, and the medium or late varieties in the South. Until more is known about the climatic and regional adaptabilities of the numerous varieties, it is suggested that plantings be made principally when tomatoes and other long-season, warm-weather crops are put in the garden.

For use as a green vegetable, soybean pods should be harvested when the seeds are fully grown but before the pods turn yellow. Most varieties produce beans in usable condition over a period of a week to 10 days. The green beans are difficult to remove from the pods unless the pods are boiled or steamed 4 to 5 minutes, after which they are easily shelled.

The yields per unit area of land are about the same as are usually obtained with peas and are thus less than can be obtained with many other vegetables. On this account, they appear of major interest only to gardeners having medium to large gardens.

Cabbage Group

The cabbage, or cole, group of vegetables is noteworthy because of its adaptation to culture in most parts of the country having fertile soil and sufficient moisture and because of its hardiness to cold.

Heading Broccoli

Heading broccoli looks much like cauliflower—even being marketed as cauliflower—but it needs much more time for development. In the South and certain parts of the West, broccoli plants may be set in summer and autumn and come to edible maturity in late winter and early spring. In the colder parts of the North, it will not live over winter, and the growing season is not long enough for most varieties. St. Valentine and White Cape are well-known, long-season varieties. Heading broccoli has practically the same soil and cultural requirements as cauliflower.

Sprouting Broccoli

Sprouting broccoli forms a loose flower head on a tall, green, fleshy, branching stalk instead of compact heads, or curds, as do cauliflower and heading broccoli. It is one of the newer vegetables in American gardens, but has been grown by Europeans for hundreds of years.

Sprouting broccoli is adapted to winter culture in areas suitable for winter cabbage. It is also tolerant of heat. Spring-set plants in the latitude of Washington, D. C., have yielded good crops of sprouts until midsummer and later under conditions that caused cauliflower to fail. In the latitude of Norfolk, Va., the plant has yielded good crops of sprouts from December until spring.

Sprouting broccoli is grown in the same way as cabbage. Plants grown indoors in the early spring and set in the open about April 1 begin to yield sprouts about 10 weeks later. The fall crop may be handled in the same way as late cabbage, except that the seed is sown later. The sprouts carrying flower buds are cut about 6 inches long, and other sprouts arise in the axils of the leaves, so that a continuous harvest may be obtained (fig. 30). Di Cicco and Early Green Sprouting are among the best known varieties.

Brussels Sprouts

Brussels sprouts are somewhat more hardy than cabbage and will live outdoors over winter in all the milder sections of the country. They may be grown as a winter crop in the South and as early and late as cabbage in the North. The sprouts, or small heads, are formed in the axils (the angle between the leaf stem and the main stalk) of the leaves (fig. 31). As the heads begin to crowd, break the lower leaves from the stem of the plant to give them more room. Always leave the top leaves; the plant needs them to supply nourish-



Figure 30.—*Sprouting broccoli, a worth-while garden vegetable.*

ment. For winter use in cold areas, take up the plants that are well laden with heads and set them close together in a pit, a coldframe, or a cellar, with some soil tamped around the roots. Keep the stored plants as cool as possible without freezing.



Figure 31.—*Brussels sprouts. The sprouts are borne in the axils of the leaves.*

Cabbage

Cabbage ranks as one of the most important home-garden crops. In the lower South, it can be grown in all seasons except summer, and in latitudes as far north as Washington, D. C., it is frequently set in the autumn, as its extreme hardiness enables it to live over winter at relatively low temperatures and thus become one of the first spring garden crops. Farther north, it can be grown as an early summer crop and as a late fall

crop for storage. Cabbage can be grown throughout practically the entire United States.

Cabbage is adapted to widely different soils as long as they are fertile, of good texture, and moist. It is a heavy feeder; no vegetable responds better to favorable growing conditions. Quality in cabbage is closely associated with quick growth. Both rotted manure or compost and commercial fertilizer should be liberally used. In addition to the applications made at planting time, a side dressing or two of nitrate of soda, sulfate of ammonia, or other quickly available nitrogenous fertilizer is advisable. These may be applied sparingly to the soil around the plants at intervals of 3 weeks, not more than 1 pound being used to each 200 square feet of space, or, in terms of single plants, $\frac{1}{3}$ ounce to each plant. For late cabbage the supplemental feeding with nitrates may be omitted.

Good seed is especially important. Only a few cents' worth of seed is needed for starting enough plants for the home garden, as 2 or 3 dozen heads of early cabbage are as many as the average family can use. Early Jersey Wakefield and Golden Acre are standard early sorts. Copenhagen Market and All Seasons are excellent midseason kinds. Flat Dutch and Danish Ballhead are largely used for late planting.

Where cabbage yellows is a serious trouble, resistant varieties should be used. The following are a few of the wilt-resistant varieties adapted to different seasons: Wisconsin Ballhead, for late storage; Wisconsin All Seasons, a kraut cabbage, somewhat earlier; Marion Market and Globe, round-head cabbages, for midseason.

Cabbage plants for spring setting in the North may be grown in hotbeds or greenhouses from seeding made a month to 6 weeks before planting time, or may be purchased from southern growers who produce them outdoors in winter. The winter-grown, hardened plants, sometimes referred to as frostproof, are hardier than hotbed plants and may be set outdoors in most parts of the North as soon as the ground can be worked in the spring. Northern gardeners can have cabbage from their gardens much earlier by using healthy southern-grown plants or well-hardened, well-grown hotbed or greenhouse plants. Late cabbage, prized by northern gardeners for fall use and for storage, is grown from plants produced in open seedbeds from sowings made about a month ahead of planting. Late cabbage may well follow early potatoes, peas, beets, spinach, or other early crop. Many gardeners set cabbage plants between potato rows before the potatoes are ready to dig, thereby gaining time. In protected places, or when plant protectors are used, it is possible always to advance dates somewhat, especially if the plants are well hardened.

Chinese Cabbage

Chinese cabbage (fig. 32) is more closely related to mustard than to cabbage. It is variously called

Petsai, Pai tsai, Petsay, and Pe-tsai. Also, it is popularly known as celery cabbage, although it is unrelated to celery. It is related to Chinese mustard. The nonheading types deserve greater attention.

Chinese cabbage seems to do best as an autumn crop in the northern tier of States. When full-grown, it is an attractive vegetable. It is not especially successful as a spring crop, and gardeners are advised not to try to grow it at any season other than fall in the North or in winter in the South.

The plant demands a very rich, well-drained but moist soil. The seeds may be sown and the plants transplanted to the garden, or the seed may be drilled in the garden rows and the plants thinned to the desired stand.



Figure 32.—Chinese cabbage, a desirable autumn crop in the Northern States.

Cauliflower

Cauliflower (fig. 33) has been called rich man's cabbage, because it is more difficult to grow than cabbage. Although hardy, it will not withstand as much frost as cabbage. Too much warm weather keeps cauliflower from heading. In the South, its culture is limited to fall, winter, and spring; in the North, to spring and fall. However, in some areas of high altitude and when conditions are otherwise favorable, cauliflower culture is continuous throughout the summer.

Cauliflower is grown on all types of land from sands to clays and peats. Although the physical character is unimportant, the land must be fertile and well drained. Manure and commercial fertilizer are essential.

The time required for growing cauliflower plants is the same as for cabbage. In the North, the main cause of failure with cauliflower in the spring is delay in sowing the seed and setting the plants. The fall crop must be planted at such a time that it will come to the heading stage in cool weather. Snowball and Dwarf Erfurt are standard varieties of cauliflower. Always take care to

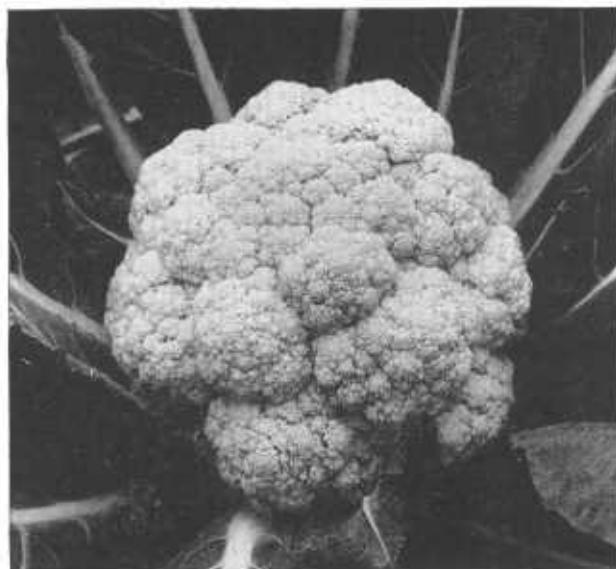


Figure 33.—A good head of cauliflower.

obtain a good strain of seed; poor cauliflower seed is most objectionable.

A necessary precaution in cauliflower culture is to tie the leaves together when the heads, or buttons, begin to form. This keeps the heads white. Cauliflower does not keep long after the heads form; 1 or 2 dozen heads are enough for the average garden in one season.

Kohlrabi

Kohlrabi is grown for its swollen stem. In the North, the early crop may be started like cabbage and transplanted to the garden, but usually it is sown in place. In the South, kohlrabi may be grown almost any time except midsummer. The seeds may be started indoors and the plants transplanted in the garden; or the seeds may be drilled in the garden rows and the plants thinned to the desired stand. Kohlrabi has about the same soil and cultural requirements as cabbage, principally a fertile soil and enough moisture. It should be harvested while young and tender. Standard varieties are Purple Vienna and White Vienna.

Onion Group

Practically all members of the onion group are adapted to a wide variety of soils. Some of them can be grown at one time of the year or another in any part of the country that has fertile soil and ample moisture. They require but little garden space to produce enough for a family's needs.

Chives

Chives are small onionlike plants (fig. 34) that will grow in any place where onions do well. They are frequently planted as a border, but are equally well adapted to culture in rows. Being a perennial, chives should be planted where they can be left for more than one season.

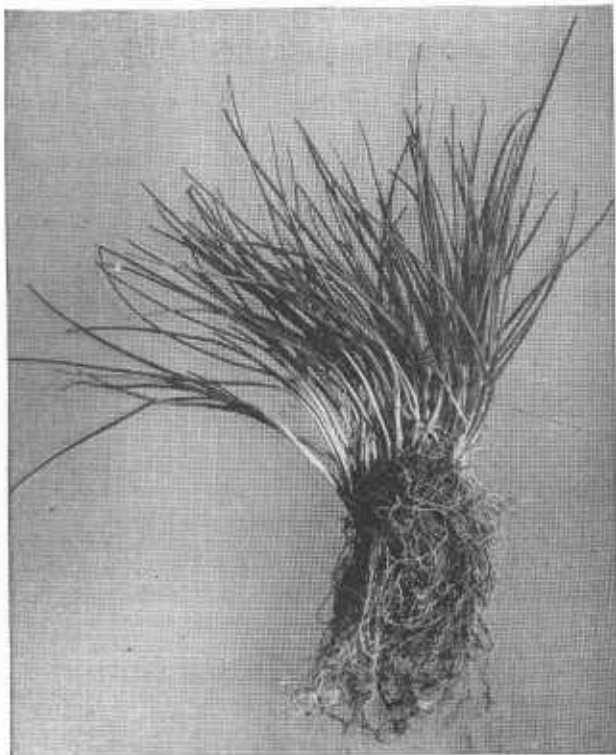


Figure 34.—A clump of chives.

Chives may be started from either seed or clumps of bulbs. Once established, some of the bulbs can be lifted and moved to a new spot. When left in the same place for several years the plants become too thick; occasional division and resetting is desirable.

Garlic

Garlic is more exacting in its cultural requirements than are onions, but it may be grown with a

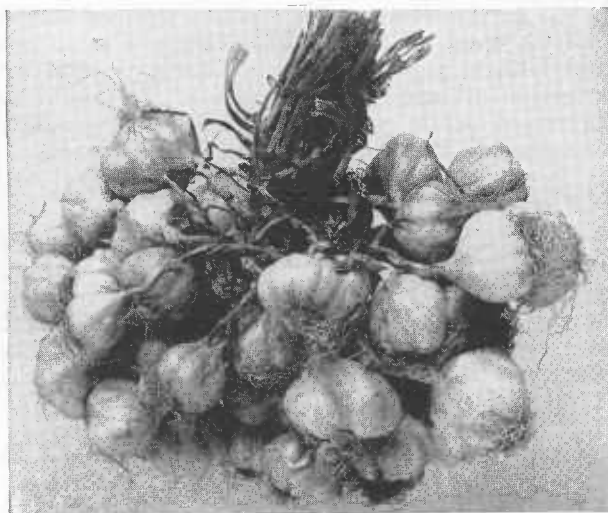


Figure 35.—Garlic. Each bulb contains several small ones that are separated for planting.

fair degree of success in almost any home garden where good results are obtained with onions. Although desirable as an addition to the list of garden crops, garlic is of minor importance.

Garlic is propagated by planting the small cloves, or bulbs, which make up the large bulbs. Each large bulb contains about 10 small ones (fig. 35). Carefully separate the small bulbs and plant them singly.

The culture of garlic is practically the same as that of onions. When mature the bulbs are pulled, dried, and braided into strings or tied in bunches, which are hung in a cool, well-ventilated place.

In the South, where the crop matures early, care must be taken to keep the garlic in a cool, dry place; otherwise it spoils. In the North, where the crop matures later in the season, storage is not so difficult, but care must be taken to prevent freezing.

Leek

Leeks resemble the onion in its adaptability and cultural requirements. Instead of forming a bulb it produces a thick, fleshy cylinder like a large green onion (fig. 36). Leeks are started from

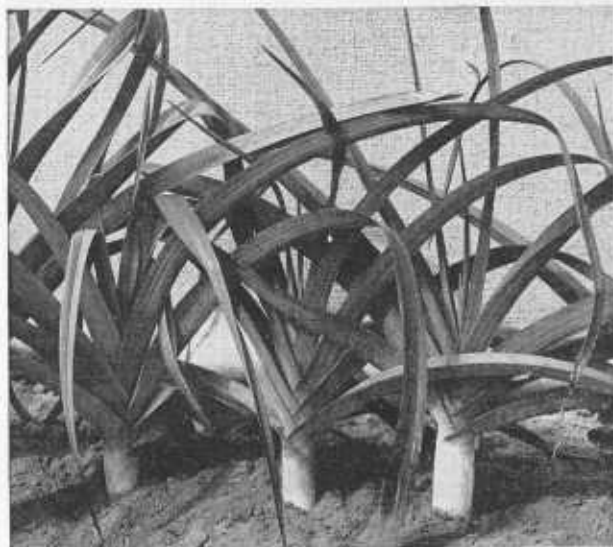


Figure 36.—Leeks. This vegetable is used for almost any purpose that its relative, the onion, is used.

seeds, like onions. Usually the seeds are sown in a shallow trench, so that the plants can be more easily hilled up as growth proceeds. Leeks are ready for use any time after they reach the right size. Under favorable conditions they grow to 1½ inches or more in diameter, with white parts 6 to 8 inches long. They may be lifted in the autumn and stored like celery in a coldframe or a cellar.

Onion

Onions thrive under a wide variety of climatic and soil conditions, but do best with an abundance of moisture and a temperate climate, without ex-



Figure 37.—A bunch of southern-grown onion plants suitable for the home garden.

tremes of heat or cold through the growing season. In the South, the onion thrives in the fall, winter, and spring. Farther north, winter temperatures may be too severe for certain types. In the North, onions are primarily a spring, summer, and fall crop.

Any type of soil will grow onions, but it must be fertile, moist, and in the highest state of tilth. Both rotted manure and commercial fertilizer, especially one high in phosphorus and potash, should be applied to the onion plot. A pound of manure to each square foot of ground and 4 or 5 pounds of fertilizer to each 100 square feet is about right. The soil should be very fine and free from clods and foreign matter.

Onions may be started in the home garden by the use of sets, seedlings, or seed. Sets, or small dry onions, grown the previous year—preferably not more than $\frac{3}{4}$ inch in diameter—are usually employed by home gardeners. Small green plants grown in an outdoor seedbed in the South (fig. 37) or in a hotbed or a greenhouse are also in general use. The home-garden culture of onions from seed is satisfactory in the North where the summers are comparatively cool.

Sets and seedlings cost about the same; seeds cost much less. In certainty of results the seedlings are best; practically none form seedstalks.

Seed-sown onions are uncertain unless conditions are extremely favorable.

Several distinct types of onions may be grown. The Potato (Multiplier) variety is planted in the fall or early spring for green onions. The Top (Tree) onion is used in the same way. The Bermuda, a large, flat, mild-flavored type, is used extensively in home gardens in the Southern half of the country for growing green onions and dry bulbs. Unfortunately, it is a poor keeper. The Sweet Spanish and the Prizetaker, large, mild-flavored, straw-colored, spherical onions, keep well. The Southport White Globe, White Portugal, Ebenezer, Yellow Globe Danvers, Southport Yellow Globe, and Southport Red Globe are commonly used for the main or northern crop. All of them may be used for either green or dry onions.

Shallot

The shallot is a small onion of the Multiplier type. Its bulbs have a more delicate flavor than most onions. Its growth requirements are about the same as those of most other onions. Shallots seldom form seed and are propagated by means of the small cloves, or divisions, into which the plant splits during growth. The plant is hardy and may be left in the ground from year to year, but best results are to be had by lifting the clusters of bulbs at the end of the growing season and replanting the smaller ones at the desired time.

Fleshy-Fruited, Warm-Season Vegetables

The fleshy-fruited, warm-season vegetables, of which the tomato is the most important, are closely related and have about the same cultural requirements. All must have warm weather and fertile, well-drained soil for good results.

Eggplant

Eggplant is extremely sensitive to the conditions under which it is grown. A warm-weather plant, it demands a growing season of from 100 to 140 days with high average day and night tempera-



Figure 38.—The eggplant is a popular vegetable that requires little space.

tures. The soil, also, must be well warmed up before eggplant can safely be set outdoors.

In the South, eggplants are grown in spring and autumn; in the North, only in summer. The more northerly areas, where a short growing season and low summer temperatures prevail, are generally unsuitable for eggplants. In very fertile garden soil, which is best for eggplant, a few plants will yield a large number of fruits.

Sow eggplant seeds in a hotbed or greenhouse, or, in warm areas, outdoors about 8 weeks before the plants are to be transplanted. It is important that the plants be kept growing without check from low or drying temperatures or other causes. They may be transplanted like tomatoes. Good plants have stems that are not hard or woody; one with a woody stem rarely develops satisfactorily. Black Beauty (fig. 38) and Florida Highbush are good varieties.

Pepper

Peppers are more exacting than tomatoes in their requirements, but may be grown over a wide range in the United States. Being hot-weather plants, peppers cannot be planted in the North until the soil has warmed up and all danger of frost is over. In the South, planting dates vary with the location, fall planting being practiced in some locations. Start pepper plants 6 to 8 weeks before needed. The seeds and plants require a somewhat higher temperature than those of the tomato. Otherwise they are handled in exactly the same way.

Hot peppers are represented by such varieties as Red Chili and Long Red Cayenne; the mild-flavored by Early Giant, Ruby King, Worldbeater, and California Wonder (fig. 39), which mature in the order given.



Figure 39.—*California Wonder* variety of pepper.

Tomato

Tomatoes grow under a wide variety of conditions and require only a relatively small space for a large production. Of tropical American origin, the tomato does not thrive in very cool weather. It will, however, grow in winter in home gardens in the extreme South. Over most of the upper South and the North, it is suited to spring, summer, and autumn culture. In the more northern areas, the growing season is likely to be too short for heavy yields, and it is often desirable to increase earliness and the length of the growing season by starting the plants indoors. By adopting a few precautions, the home gardener can grow tomatoes practically everywhere, given fertile soil with sufficient moisture.

A liberal application of manure and commercial fertilizer in preparing the soil should be sufficient for tomatoes under most conditions. In applying manure or fertilizer, avoid the excessive use of such materials as poultry manure and fertilizers having a heavy proportion of nitrogen; they might give too much vine growth and cause failure to set fruits. Heavy applications of manure and fertilizer should be broadcast, not applied in the row; but small quantities may be mixed with the soil in the row in preparing for planting.

Start tomato plants from 5 to 7 weeks before they are to be transplanted to the garden. Enough plants for the home garden may be started in a window box and transplanted to small pots, paper drinking cups with the bottoms removed, plant bands (round or square), or other soil containers. In boxes, the seedlings are spaced 2 to 3 inches apart. Tomato seeds germinate best at about 70° F., or ordinary house temperature. Growing tomato seedlings, after the first transplanting, at moderate temperatures, with plenty of ventilation, as in a coldframe, gives stocky, hardy growth. If desired, the plants may be transplanted again to larger containers, such as 4-inch clay pots or quart cans with holes in the bottom.

Tomato plants for all but the early spring crop are usually grown in outdoor seedbeds. Thin seeding and careful weed control will give strong, stocky plants for transplanting.

Over most of the eastern United States, Rutgers, Marglobe, and Pan America are well-established wilt-resistant varieties. In the North, where the growing season is short, quick-growing varieties like Bounty, Victor, and Bison are often used. In the Central and High Plains region, Bison, Bounty, Danmark, Early Chatham, and Red Cloud are used.

In the Southwest, Stone, Norton, Pearson, and Santa Clara Canner are grown. Santa Clara Canner is adapted only to the warmer parts of California.

Tomatoes are sensitive to cold. Never plant them until danger of frost is past. By using plant protectors during cool periods the home gardener

can set tomato plants somewhat earlier than would otherwise be possible. Hot, dry weather, like midsummer weather in the South, is also unfavorable for planting tomatoes. Planting distances depend on the variety and on whether the plants are to be pruned and staked or not. If pruned to one stem, trained, and tied to stakes or a trellis, they may be set 18 inches apart in 3-foot rows (fig. 40); if not, they may be planted 3 feet apart in

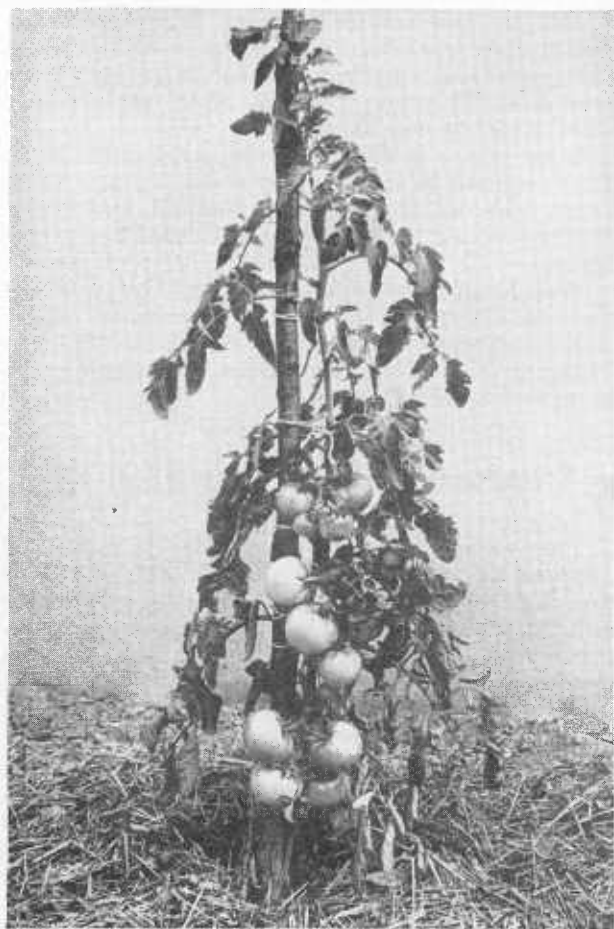


Figure 40.—Tomato plant pruned to a single stem and tied to a stake. The straw mulch on the soil is used for conserving moisture, controlling weeds, and reducing need for cultivation.

rows 4 to 5 feet apart. Pruning and staking have many advantages for the home gardener. Cultivation is easier, and the fruits are always clean and easy to find. Staked and pruned tomatoes are, however, more subject to losses from blossom-end rot than those allowed to grow naturally.

Miscellaneous Vegetables

Florence Fennel

Florence fennel is related to celery and celeriac. Its enlarged, flattened leafstalk is the portion used. For a summer crop, sow the seeds in the

rows in spring; for an autumn and winter crop in the South, sow them toward the end of the summer. Thin the plants to stand about 6 inches apart. When the leafstalks have grown to about 2 inches in diameter the plants may be slightly mounded up and partially blanched. They should be harvested and used before they become tough and stringy.

Okra

Okra, or gumbo, has about the same degree of hardiness as cucumbers and tomatoes and may be grown under the same conditions. It thrives on any fertile, well-drained soil. An abundance of quickly available plant food will stimulate growth and insure a good yield of tender, high-quality pods (fig. 41).

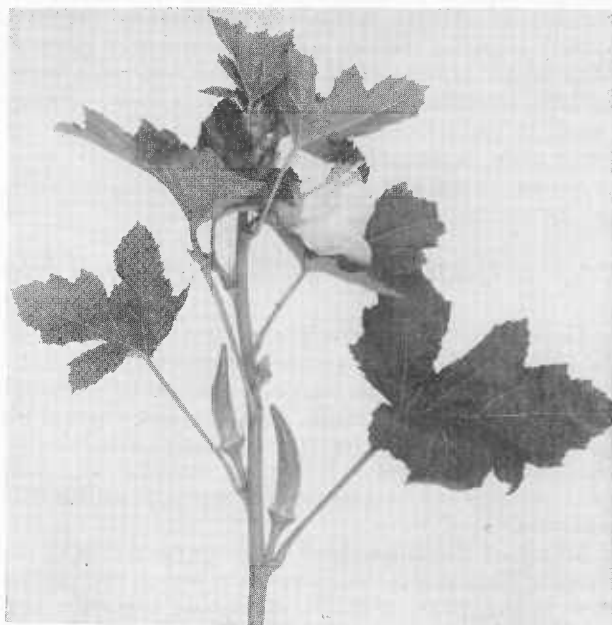


Figure 41.—Okra, with pods in prime condition.

As okra is a warm-weather vegetable, the seeds should not be sown until the soil is warm. The rows should be from 3 to 3½ feet apart, depending on whether the variety is dwarf or large growing. Sow the seeds every few inches and thin the plants to stand 18 inches to 2 feet apart in the rows. Clemson Spineless, Perkins Mammoth, and Dwarf Green are good varieties. The pods should be picked young and tender, and none allowed to ripen. Old pods are unfit for use and soon exhaust the plant.

Physalis

Physalis, known also as groundcherry and husk tomato, is closely related to the tomato and can be grown wherever tomatoes do well. The kind ordinarily grown in gardens produces a yellow fruit about the size of a cherry. The seeds may be started indoors or sown in rows in the garden.

Sweet Corn

Sweet corn requires plenty of space and is adapted only to the larger gardens. Although a warm-weather plant, it may be grown in practically all parts of the United States. It needs a fertile, well-drained, moist soil. With these requirements met, the type of the soil does not seem to be especially important, but a clay loam is almost ideal for sweet corn.

In the South, sweet corn is planted from early spring until autumn, but the corn earworm, drought, and heat make it difficult to obtain worthwhile results in midsummer. The ears pass the edible stage very quickly, and succession plantings are necessary to insure a constant supply. In the North, sweet corn cannot be safely planted until the ground has thoroughly warmed up. Here, too, succession plantings need to be made to insure a steady supply. Sweet corn is frequently planted to good advantage after early potatoes, peas, beets, lettuce, or other early, short-season crop. Sometimes, to gain time, it may be planted before the early crop is removed.

Sweet corn may be grown in either hills or drills,

in rows at least 3 feet apart. It is well to plant the seed rather thickly and thin to single stalks 14 to 16 inches apart or three plants to each 3-foot hill. Experiments have shown that in the eastern part of the country there is no advantage in removing suckers from sweet corn. Cultivation sufficient to control weeds is all that is needed.

Hybrid sweet corn varieties, both white and yellow, are usually more productive than the open-pollinated sorts. As a rule, they need a more fertile soil and heavier feeding. Many are resistant to disease, particularly bacterial wilt. Never save seed from a hybrid crop for planting. Such seed does not come true to the form of the plants from which it was harvested.

Good yellow-grained hybrids, in the order of the time required to reach edible maturity, are Spancross, Marcoss, Golden Cross Bantam, and Ioana. White-grained hybrids are Iogent and Evergreen hybrid.

Well-known open-pollinated yellow sorts are Golden Bantam and Golden Sunshine. Open-pollinated white sorts, in the order of maturity, are Howling Mob, Early Evergreen, Country Gentleman, and Stowell Evergreen.

Canning, Freezing, and Storing Vegetables for Home Use

In the South it is possible to harvest fresh vegetables direct from the garden practically throughout the year, but even so, preservation of seasonal crops, peas, for example, and surplus vegetables makes it desirable to spread their availability throughout the year. Freezing, canning, and natural storage provide means for accomplishing this purpose.

Many of the important home-garden crops, including asparagus, snap and shelled green beans, lima beans, peas, spinach, sprouting broccoli, and sweet corn, may be made available throughout the year, in a condition closely approaching that of the garden-fresh material by storing in a home freezer or a community locker. Many gardeners grow substantial amounts of those varieties of vegetables that are adapted to preservation by freezing and place the season's supply of a particular crop in the freezer all at one time.⁶

Canning provides a convenient and in some cases the only satisfactory method for keeping certain vegetables. Probable requirements for preserving by this method should also be taken into consideration when selecting varieties to be grown and planning the garden.

⁶Information on this subject is contained in Agricultural Information Series AIS-48, Home Freezing of Fruits and Vegetables.

The home storage of vegetables is very well adapted to all that part of the country where freezing temperatures prevail during the winter months. There are at least 10 important vegetables that can be stored for winter use. Certain vegetables, like cabbage, turnips, beets, carrots, and celery, may be stored in pits in the open ground; potatoes, sweetpotatoes, and onions are stored to best advantage in cellars or specially designed storage houses. Temperature, moisture control, and ventilation are the main points involved in the successful home storage of vegetables.⁷

The root crops, including beets, carrots, winter radishes, and turnips, and also such crops as collards, kale, and spinach, may remain where they are grown throughout the late fall and early winter in nearly all parts of the South. These crops, however, will start a new growth as soon as the weather begins to get warm in the late winter and will produce seedstalks, after which they are unfit for the table. In sections of the South where temperature conditions make it impossible to store vegetables for off-season use, canning and freezing should be substituted.

⁷Farmers' Bulletin 1939, Home Storage of Vegetables and Fruits, gives information relative to storage structures and methods of caring for vegetables and fruits in storage.

